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# Marine Review

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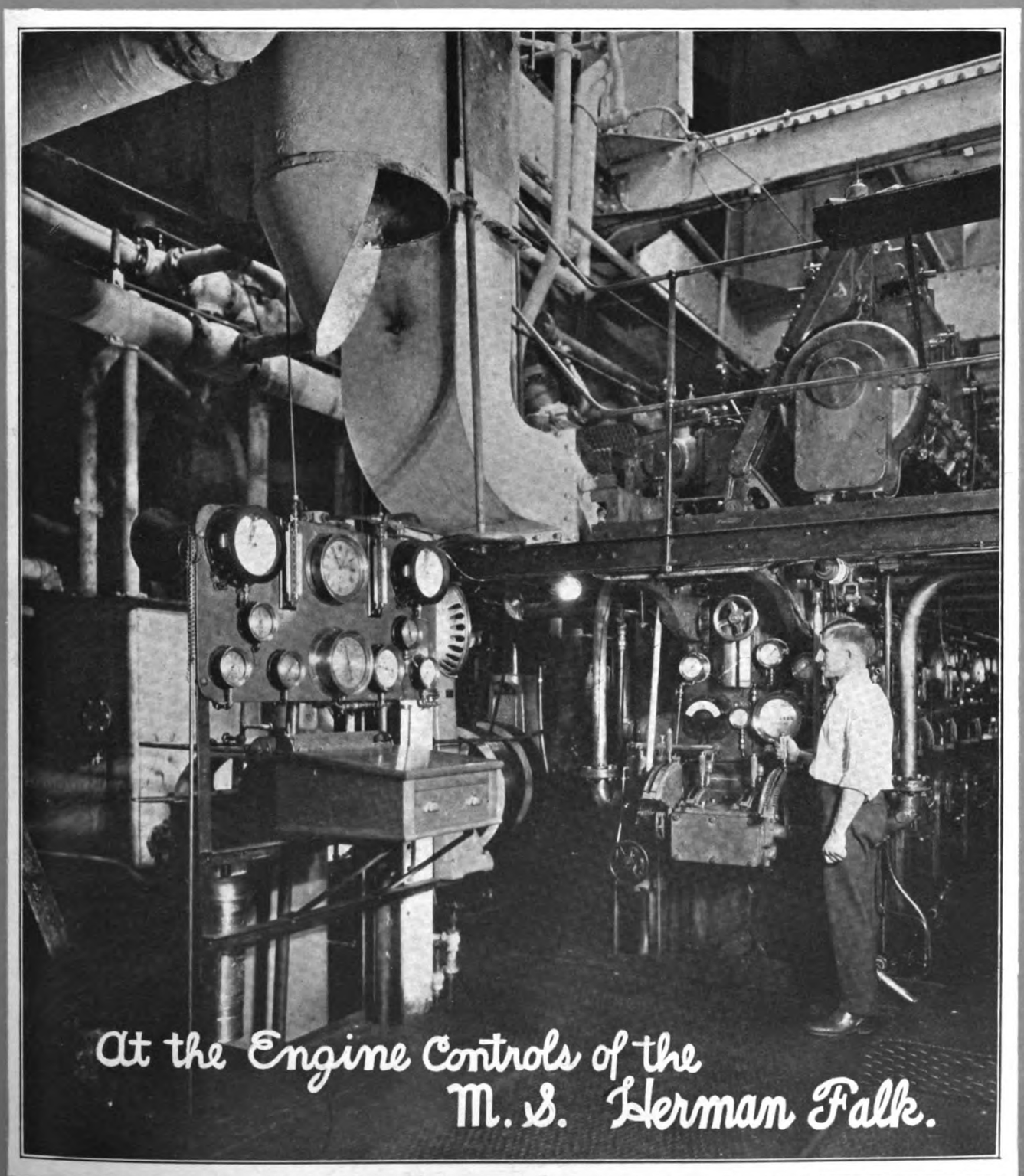
*The National Publication Covering the Business of Transportation by Water*

**December, 1927**

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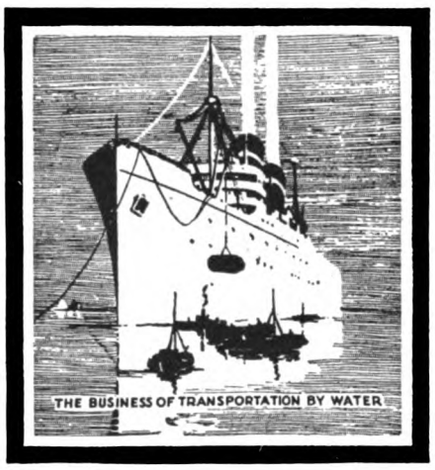
# Marine Review

*The National Publication Covering the Business of Transportation by Water*

CLEVELAND FOUNDED 1878 NEW YORK



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# CONTENTS


*Vol. 57* **December 1927** *No. 12*



| | Page |
|---|---|
| Wabash—Largest Carferry Described.... By A. H. Jansson | 11 |
| Pulverized Coal Installation on S. S. Mercer.... | 19 |
| Geared Diesels in Tanker Herman Falk.... | 20 |
| Flettner Rudder Tests on U. S. S. Converse.... | 24 |
| Seminole—Converted to Diesel—Trials.... By H. R. Simonds | 25 |
| Naval Architects Annual Meeting.... | 29 |
| Fuel Oil Contracts Awarded.... | 33 |
| James Swan Joins New England S. S. Co.... | 33 |
| Auxiliaries—Electric on Shipboard.... Second and Concluding Installment By A. O. Loomis | 34 |
| Dock Management Progress Section.... Port Newark—A Growing Ocean Port | 36 |
| Malolo—Begins Service to Honolulu.... | 39 |
| What the British Are Doing.... | 40 |
| What's Doing Around the Lakes.... | 40 |
| Freight Rates—Ocean—Bunker Prices.... | 41 |
| Maritime Law—Late Decisions.... By Harry Bowne Skillman | 42 |
| Saratoga—Airplane Carrier Delivered.... | 43 |
| Keel Laid for Sister Ship to California.... | 43 |
| Marine Business Statistics—Ports.... | 44 |
| Cornbrooks Appointed Shipyard Manager.... | 45 |
| Lake Diversion Permit Declared Valid.... | 45 |
| Personal Sketches of Marine Men.... H. F. Alexander, President, Pacific Steamship Co. | 46 |
| Bath Iron Works Reopened.... | 52 |
| Compensation Act for Ship Workers in Force.... | 54 |
| Lake Levels for October.... | 54 |
| Marine Disasters—Late Flashes On.... | 56 |



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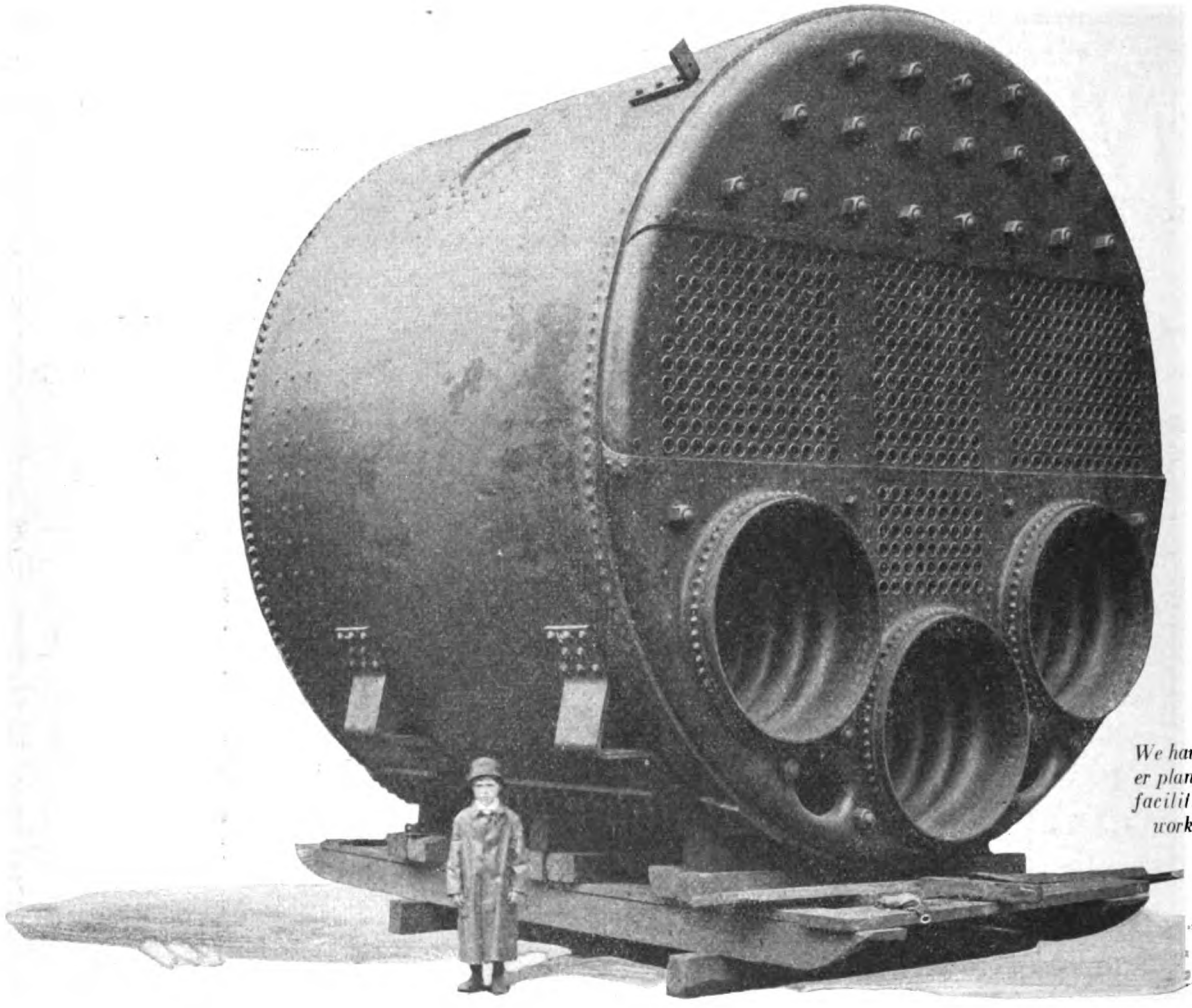

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# Don't Wait Too Long

A large part of the present Great Lakes fleet has been built about 25 years. The original boilers on these vessels have never been replaced. The average efficient life of a steam boiler is from 25 to 30 years—with the latter figure as the deadline.

Steam pressures are usually cut down on old boilers, which means loss of engine power and loss of speed. The efficiency of old boilers is generally low, due to the formation of scale on inaccessible surfaces. The cost of maintenance on old boilers is a constantly increasing factor.

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*Carferry Wabash—Largest Vessel of her Type on the Great Lakes*

# Wabash—Largest Lake Carferry Is Designed for Severe Service

By A. H. Jansson

THE Ann Arbor railroad crosses the State of Michigan, from Toledo on Lake Eric at the northern border of Ohio, approximately in a straight line, diagonally to the lake port of Frankfort on Lake Michigan. On the opposite or west shore of Lake Michigan lie the important industrial agricultural and mining sections of Wisconsin and upper Michigan. In former days this large body of water which is from 60 to 90 miles across at this point, presented a serious barrier to through transportation. But the development in the design of carferries, in capacity, seaworthiness and general efficiency, since the first two small wooden ferries were placed in commission late in 1892, has been so remarkable that today transferring cars from rail to water shortens the haul by hundreds of miles and greatly reduces transportation cost.

As shown on the accompanying map the four points served, from Frankfort, the east shore Lake Michigan terminal, by the Ann Arbor railroad, with its system of carferries, and the distances from this terminal are, Manistique, Mich., 92 miles; Menominee, Mich., 79 miles; Kewaunee, Wis., 63 miles; and Manitowoc, Wis., 79 miles. The regular fleet of the Ann Arbor railroad consists of five all-steel carferries with comfortable modern passenger accommodations. It will be noted from the accompanying table of particulars of these vessels that the last one of the group, ANN ARBOR No. 7 was completed early in 1925.

Traffic has increased steadily. The total car movement east and west loaded and empty cars between the ports given above grew from 32,297 in 1910 to 80,272 in 1925. Though the figures are not available at this writing for the entire year 1926 the first two months of that year indicated a growth similar to that of 1925 over 1924 when 69,038 cars were transported. It is also interesting to note that the capacity of the entire fleet for all trips made in 1925 was 94,864 cars, so that 84.6 per cent of maximum capacity was used. While the average number of cars per trip was 22.3 the average full capacity for each ferry was about 26.3. This shows how nearly up to capacity the Ann Arbor fleet operated during 1925 after the addition of its latest vessel, the ANN ARBOR No. 7. When the Wabash railroad actively took over the management of the Ann Arbor line it was quickly recognized by J. E. Taussig, president of both roads that it would be necessary for conservatively anticipated growth to provide further equipment.

We thus come to the placing of the order for



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the WABASH, the largest carferry ever built on the Great Lakes. Certain details are given in an accompanying table. Though the WABASH like the Ann Arbor ferries was primarily built to carry railroad cars, this vessel is exceptionally well fitted with attractive and comfortable passenger accommodations. These accommodations included cabins, a ladies parlor, men's smoking room, dining room, wireless telegraph and all other modern conveniences for the comfort and safety of travelers. Now that the use of the automobile has become so universally popular it is expected that this trade will grow rapidly. These ferries do not operate upon schedule and their departure is governed by freight on hand at the ports touched at. However, a boat leaves Frankfort, Mich., for each of the ports of call at least once in every 24 hours and at times the service is more frequent.

**Table I**

## Carferry Wabash

| | |
|---|---|
| Built at Toledo, Ohio, 1927 | |
| Length overall, ft., ins. | 380-0 |
| Length between p.p. ft., ins. | 368-0 |
| Beam molded, ft., ins. | 57-6 |
| Depth molded to main deck, ft , ins. | 21-6 |
| Capacity in railroad cars (42 ft. long) | 30 |
| Gross tonnage | 3366 |
| Net tonnage | 2023 |
| Official number | 226,597 |
| Speed in statute miles | 14 |
| Engines—Two steam triple expansion | |
| Diameter of cyls. ins. | 20½x34x56 |
| Stroke, ins. | 36 |
| Indicated h.p. (for 2 engines) | 2750 |
| Propellers, solid cast steel (No. of). | 2 |
| Diameter, ft., ins. (about) | 12-0 |
| Pitch, ft., ins. (about) | 14-0 |
| Boilers—Scotch type (No. of) | 4 |
| Steam pressure lbs. sq. in. | 185 |
| Diameter, ft., ins. | 14-6 |
| Length, ft., ins. | 12-0 |
| Heat. surface sq. ft. one boiler | 2750 |
| Forced draft—coal burner | |
| Capacity in coal bunkers in tons. | 440 |

### Build Largest Carferry

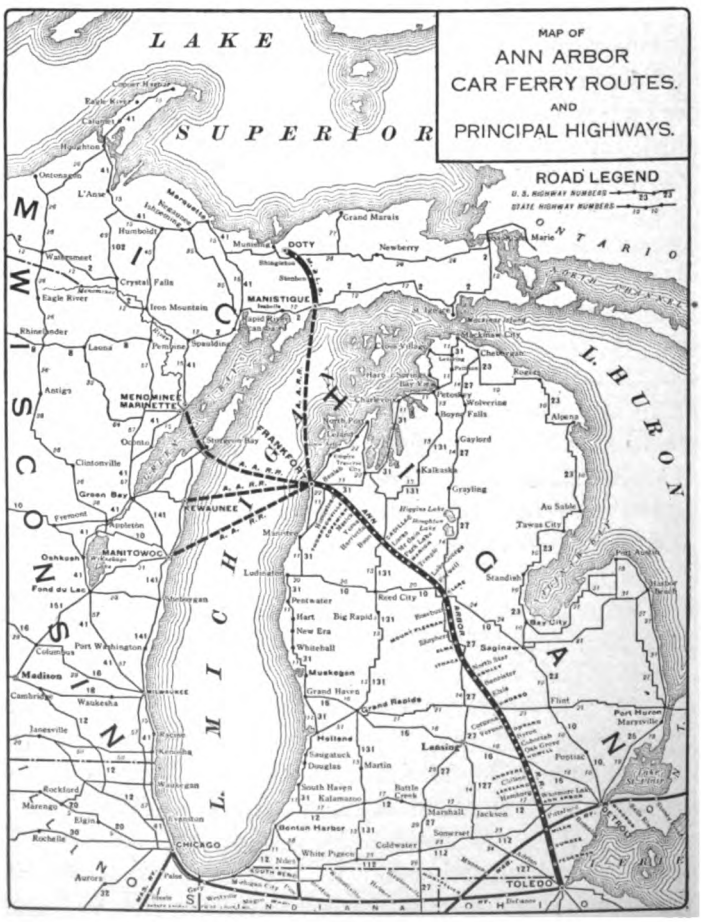
When it was decided to contract for a new vessel, R. H. Reynolds, marine superintendent of the Ann Arbor railroad was called in by Mr. Taussig, president of the Wabash road. Proposals based on specifications prepared by Mr. Reynolds were received from the leading shipyards on the Great Lakes, the American Ship Building Co., the Great Lakes Engineering Works, the Manitowoc Shipbuilding Corp. and the Toledo Shipbuilding Co., Inc. Bids were received for one, two and three boats. The bids varied for one boat from $807,200 to $887,300 with time of delivery from eight to ten months and for two boats from $790,325 to $866,634. The contract for one boat was finally awarded to the Toledo Shipbuilding Co., Inc., Toledo, O. Actual construction began by laying of the keel Oct. 20, 1926. The vessel was launched March 19, 1927 and she was completed June 25, 1927. Though owned by the Wabash Railroad Co. she is now leased to the Ann Arbor Railroad Co. and operates on regular schedule with the five Ann Arbor ferries on Lake Michigan between Frankfort, Mich., and the ports referred to above.

The WABASH is a twin screw, substantially constructed, steel carferry. She has two complete decks, the main deck with four tracks for carrying cars and a shade deck. The trackage on the car deck has capacity for thirty 42-foot cars. There is a steel deck house on the shade deck for accommodation of crew and passengers. The bow is cut away, and also heavily stiffened for ice crushing. No less than 25 inches of solid ice has been crushed by ferries of the Ann Arbor railroad in actual service. The hull is of single bottom construction and there are seven water tight bulkheads in way of the lower hold space. Boiler and engine rooms are located amidship. An average speed of at least 13½ miles per hour is possible in loaded condition at a mean draft of 15 feet.

It may be interesting to note briefly certain structural features of the hull. The keel is of the flat plate type, 48 inches wide and of 32½-pound plate. The stem is of steel 11 inches by 4 inches in section. The stern frome is of forged steel also of 11 by 4 inches section tapering to 10 by 3 inches at the head. Shaft brackets are of cast steel. Framing for the vessel between the forward and aft collision bulkhead is of 10-inch by 23.6-pound channels spaced 24 inches. All frames extend to the main deck and alternate frames extend to the shade deck. Forward of the forward collision bulkhead the framing is of 8 inch by 18-pound bulb angles spaced 18 inches. All frames in this section are extended to the shade deck. Aft of the after peak bulkhead the framing is of 6-inch by 15-pound channels spaced 24 inches and all extending to the main deck with alternate frames extending to the shade deck. Reverse frames throughout are of single angles 3½ x 3½ inches x11.1-pound except in way of engine and boiler foundation where double reverse frames of same size angles are used.

The floors are 36 inches high and are carried straight across the ship. The floors in the holds are of 20-pound plate diminished to 16 pounds at ends and increased to 22-pound plate in the engine and boiler space. There is a center keelsom 36 inches high of 27.5-pound plate. On the top of the center keelsom is fitted a rider plate 36 inches wide of 25-pound plate. The bottom angles to the center keelsom are 5 x 4 inches x 14:5 pounds and the top angles are 3½ x 3½ inches x 11.1 pounds. The center keelsom is continuous through watertight bulkheads. In the forward end of the vessel intercostal center line plates are fitted connected to the floors.

There are two side keelsons on each side, both of 15-pound plate intercostal between floors. In way of engines and boilers there are additional keelsons, also forward and after ends of the vessel. There is



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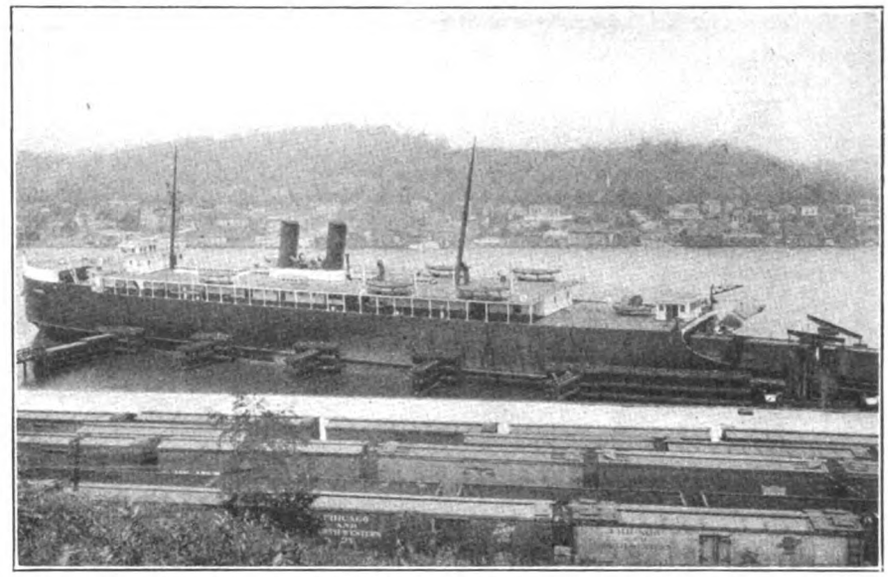
also a bilge keelsom fitted at lower turn of bilge and of 10 inches by 24.3-pound channels riveted to the frames. In the hold there is a 'tween deck stringer of 49 inches x 17½-pound plate. There are also two intermediate stringers fitted in the hold space, one midway between the hold stringer plate and the main deck, the other midway between the hold stringer plate and the bilge stringer. The main deck plating is of 17½-pound plate and the main deck beams are of 12-inch x 30.9-pound channels fitted to every frame and with a camber of 9 inches in 57 feet 6 inches. The beam knees are 36 x 36 inches x 17½-pound plate fitted at every beam.

In the hold, beams of 10 inches x 29.9-pound channels are fitted at every fourth frame. Where these hold beams are omitted as required in way of machinery arrangement the hold stringers are reinforced. In the forward and after peaks hold beams of 6 x 3½ inches x 15-pound channels are fitted on every frame. Stanchions in five rows are fitted in the hold of the vessel. One center line row and two intermediate rows on



CARFERRY WABASH LOADING RAILROAD CARS, FRANKFORT, MICH.

LOOKING FORWARD ON STARBOARD SIDE OF SHADE DECK CARFERRY WABASH

**Table III**

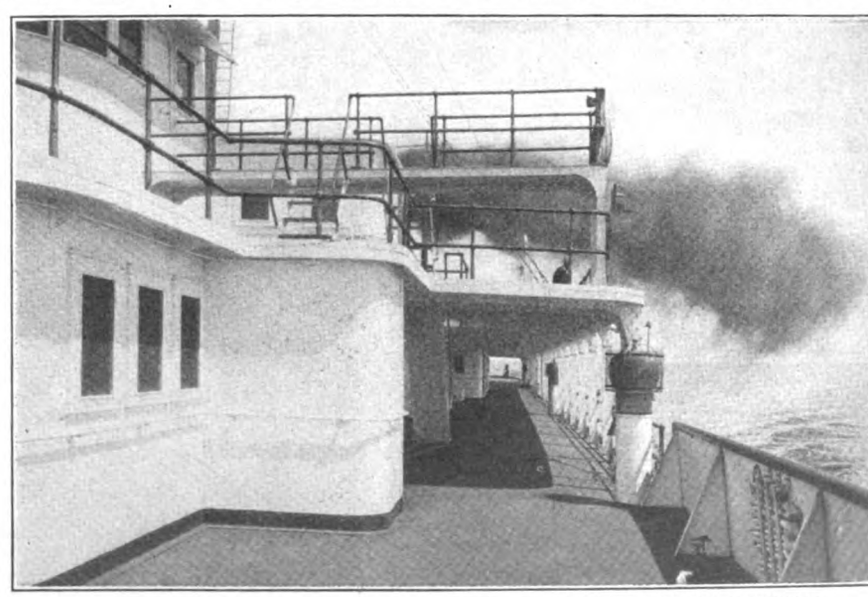
## Carferry Ann Arbor No. 4

| | |
|---|---|
| Built at Cleveland 1906 | |
| Length overall, ft , ins. | 270-0 |
| Length on keel. ft., ins. | 259-0 |
| Beam molded, ft., ins. | 52-0 |
| Depth molded, ft., ins. | 19-0 |
| Height between decks | 17-2 |
| Capacity in railroad cars | 20 |
| Gross tonnage | 1779 |
| Net tonnage | 722 |
| Official number | 203,695 |
| Engines—Two steam triple expansion | |
| Diameter of cyls. ins. | 14x22½x38 |
| Stroke, ins. | 32 |
| Propellers (No. of) | 2 |
| Diameter, ft., ins. | 10-6 |
| Pitch, ft., ins. | 12-6 |
| Revolutions for one mile | 925 |
| Boilers—Scotch type (No. of) | 2 |
| Steam pressure lbs., sq. in. | 175 |
| Diameter, ft., ins. | 12-10 |
| Length, ft., ins. | 12-0 |
| Grate surface sq. ft. | 48 |
| Natural draft—Coal burner | |

**TABLE II**

## Carferry Ann Arbor No. 3

| | |
|---|---|
| Built at Cleveland 1898; rebuilt and lengthened 48 ft. with new boilers and engines at Manitowoc 1923. | |
| Length overall, ft., ins. | 318-0 |
| Length between p.p., ft., ins. | 306-11 |
| Beam molded, ft., ins. | 52-3 |
| Depth molded, ft.. ins. | 17-1 |
| Capacity in railroad cars | 23 |
| Gross tonnage | 2048 |
| Net tonnage | 935 |
| Official number | 107,418 |
| Engines — Two steam triple expansion | |
| Diameter of cyls. ins. | 15x26x44 |
| Stroke, ins. | 26 |
| Crankshaft, diameter ins. | 8¼ |
| Line shaft, dia. ins. | 9 |
| Propellers (No. of) | 2 |
| Diameter, ft., ins. | 10-6 |
| Pitch, ft., ins. | 11-6 |
| Revolutions for one mile | 925 |
| Boilers—Scotch type (No. of) | 2 |
| Steam pressure lbs. sq. in. | 180 |
| Diameter, ft., ins. | 13-0 |
| Length, ft., ins. | 11-6 |
| Heat. surf. sq. ft. one boiler | 2014 |
| Grate surface sq. ft. | 44 |
| Forced draft—Coal burner | |



LOOKING AFT ON PORT SIDE OF SHADE DECK CARFERRY WABASH



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either side extending from forward to after collision bulkheads. The center line stanchions are of single 10-inch x 21.9-pound channels spaced at hold beams or 8 feet.

**Table IV**

**Carferry Ann Arbor No. 5**

| | |
|---|---|
| Built at Toledo 1910 | |
| Length overall, ft., ins. | 377-9½ |
| Length between perpendiculars, ft., ins. | 361-3 |
| Beam molded, ft., ins. | 56-0 |
| Depth molded, to main deck, ft., ins. | 21-0 |
| Depth molded, to upper deck, ft., ins. | 38 4 |
| Capacity in railroad cars | 30 |
| Gross tonnage | 2884 |
| Net tonnge | 1961 |
| Official number | 208,261 |
| Engines—Two steam triple expansion | |
| Diameter of cyl., ins. | 21x33x52 |
| Stroke, ins. | 40 |
| Propellers, solid cast steel (No. of) | 2 |
| Diameter, ft., ins. | 12-6 |
| Pitch, ft., ins. | 14-0 |
| Developed area sq. ft. | 60 |
| Revolutions for one mile | 740 |
| Boilers—Scotch type (No. of) | 4 |
| Steam pressure lbs. sq. in. | 185 |
| Diameter, ft., ins. | 13-6 |
| Length, ft., ins. | 12-0 |
| Heat. surf. sq. ft. one boiler | 2024 |
| Grate surface sq. ft. | 46 |
| Forced draft—Coal burner | |

The shell plating is fitted in clinker or in and out strakes. The sheer strake is of 32-pound plate doubled over two-thirds length amidship. The next strake below is of 30-pound plate doubled from the stem to well aft of amidship. The next strake below is also 30-pound plate and is doubled from the stem, 100 feet aft. All of the plating below this strake with the exception of the keel is of 25.5-pound plate.

### Shade Deck Support and Plating

The shade deck is supported by channel beams 7 inches x 18.6-pound spaced at alternate frames 4 feet between centers. From the aft end of the deck house the deck and beams are stiffened to carry automobiles. The stanchions for the shade deck fitted on the center line of the ship and spaced 8 feet between centers are made up of double 6-inch x 15-pound channels. On top of the stanchions is fitted a fore and after of 10-inch x 21.9-pound channels. The shade deck stringer plate is of 17½-pound plate 54 inches wide and the remainder of the shade deck plating is of 10.2-pound plating. All of this deck is caulked watertight and stiffened with intercostal angles at seams between deck beams.

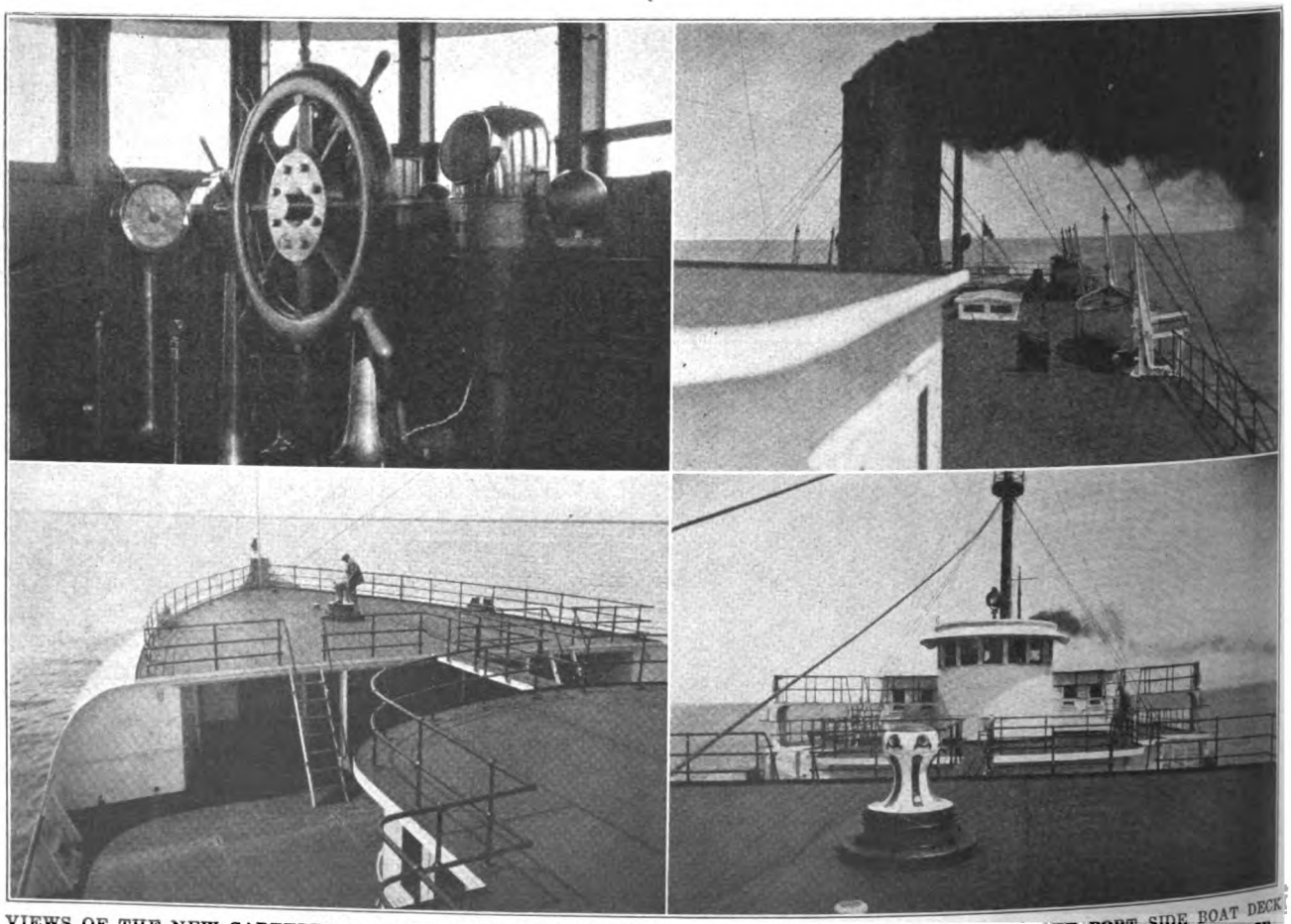
Rails of usual section weighing 75 pounds per yard are fitted on the car deck, both inner and outer rails for each track being level. The rails are carried on stools formed of 4-inch x ⅞-inch flat bars and spaced one for each beam. These stools are riveted to the deck and to the rails.

There are seven water tight bulkheads in the lower hull, forming eight compartments as follows: Fore peak tank and chain locker, Numbers 1 and 2 holds, boiler room and coal bunker, engine room, Number 3 hold and two compartments of after peak tank. All the bulkheads are of 15-pound plate below the hold stringer, except

**Table V**

**Carferry Ann Arbor No. 6**

| | |
|---|---|
| Built at Ecorse, Mich., 1917 | |
| Length overall, ft., ins. | 350-0 |
| Length on keel, ft., ins. | 338-0 |
| Beam molded, ft., ins. | 56-0 |
| Depth molded, ft., ins. | 18-3 |
| Capacity in railroad cars | 28 |
| Gross tonnage | 2716 |
| Net tonnage | 1679 |
| Official number | 214,656 |
| Engines—Two steam triple expansion | |
| Diameter of cyls. ins. | 19½x31x52 |
| Stroke, ins. | 36 |
| Propellers, built up steel (No. of) | 2 |
| Diameter ft., ins. | 12-0 |
| Pitch, ft., ins. | 14-0 |
| Revolutions for one mile | 820 |
| Boilers—Scotch type (No. of) | 4 |
| Steam pressure lbs. sq. in. | 175 |
| Diameter, ft., ins. | 13-2 |
| Length, ft., ins. | 12-0 |
| Heat. surface sq. ft. one boiler | 2063 |
| Grate surface sq. ft. | 42 |
| Forced draft—Coal burner | |



VIEWS OF THE NEW CARFERRY WABASH—UPPER LEFT—PILOT HOUSE—UPPER RIGHT—LOOKING AFT PORT SIDE BOAT DECK—LOWER LEFT—TURTLE BACK OVER FORECASTLE—LOWER RIGHT—LOOKING AFT TOWARD PILOT HOUSE AND BRIDGE



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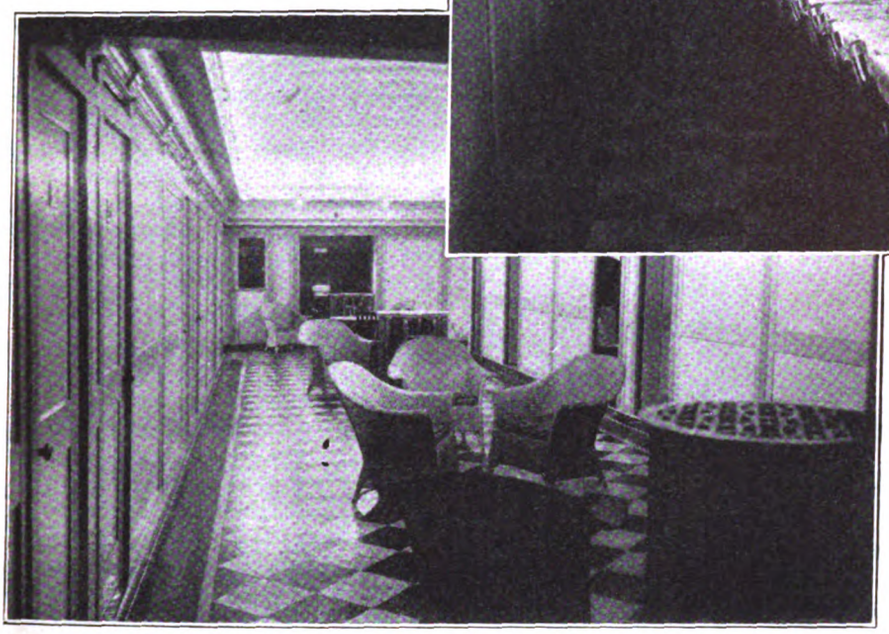
the lower strake which is of the same weight as adjacent floors, and of 12½-pound plate above and stiffened with 7-inch x 16½-pound vertical channel stiffeners, spaced 30 inches between centers and with one horizontal stiffener at the level of the lower deck of 12-inch x 20-pound channels.

Coal bunkers are arranged alongside of boilers and extend from the after end of No. 2 hold to the forward end of the engine room. Each side is divided by a 4-foot recess for ash guns. The bunker bulkheads are of 10-pound plate stiffened with 7-inch x 18.6-pound vertical channels spaced 24 inches between centers.

PASSENGER DINING ROOM ON WABASH



LOOKING AFT IN THE MAIN SALOON WITH STATEROOMS OFF ON THE WABASH

At the aft end of No. 2 hold there is fitted two wing tanks, each with a capacity of 60 tons. These tanks are arranged for trimming the ship athwartship after loading cars and are connected to the ballast pumps in the engine room. These tanks are fitted with vent pipes and sounding pipes. The forward collision bulkhead is 32 feet aft of the stem. Forward of this bulkhead on a line of the hold beam there is a watertight orlop deck which forms the fore peak tank below and the chain locker above. A similar watertight orlop deck is fitted aft of the after collision bulkhead. The space above this deck is used for steering and gate engines.

To offset panting of the vessel diagonal struts of 7-inch x 16½-pound channels is fitted in the fore peak and the forward end of No. 1 holds bracketed to frames and riveted to stanchions. A breast hook of 20-pound plate is fitted forward and secured to the shell with 3½ x 3½ inches x 8.5-pound angles.

There are four longitudinal plate girders under the main deck aft for carrying the overhang of the stern. These girders extend forward of the after peak bulkheads. A forecastle deck is fitted covering the windlass and extending aft to form paint and lamp lockers.

Hatches are fitted in the car deck above the coal bunkers 22 feet long by 3 feet 11 inches wide. These hatches are located between the wing tracks on each side and are fitted with angle coamings and gratings and also with sliding steel covers. Above

Table VI

**Carferry Ann Arbor No. 7**

| | |
|---|---|
| Built at Manitowoc, Wis. 1925 | |
| Length overall, ft., ins. | 360-0 |
| Length between p.p. ft., ins. | 348-0 |
| Beam molded, ft., ins. | 56-0 |
| Depth molded, ft., ins. | 21-6 |
| Capacity in railroad cars | 30 |
| Gross tonnage | 2934 |
| Net tonnage | 1426 |
| Speed in statute miles | 14 |
| Engines—Two steam trip'e expansion | |
| Diameter of cyls. ins. | 20½x34x56 |
| Stroke, ins | 36 |
| Propellers, solid cast steel (No. of) | 2 |
| Boi'ers—Scotch type (No. of) | 4 |
| Steam pressure lbs. sq. in. | 185 |
| Diameter, ft., ins. | 14-6 |
| Length, ft., ins. | 11-0 |
| Heat surface sq. ft. one boiler | 2438 |
| Grate surface sq. ft | 57.75 |
| Forced draft—Coal burner | |

ANN ARBOR NO. 5 AIDED BY ANN ARBOR NO. 4 BREAKING THROUGH 25 INCHES OF SOLID ICE AND 7 INCHES OF SNOW—R. H. REYNOLDS HOLDING RULE



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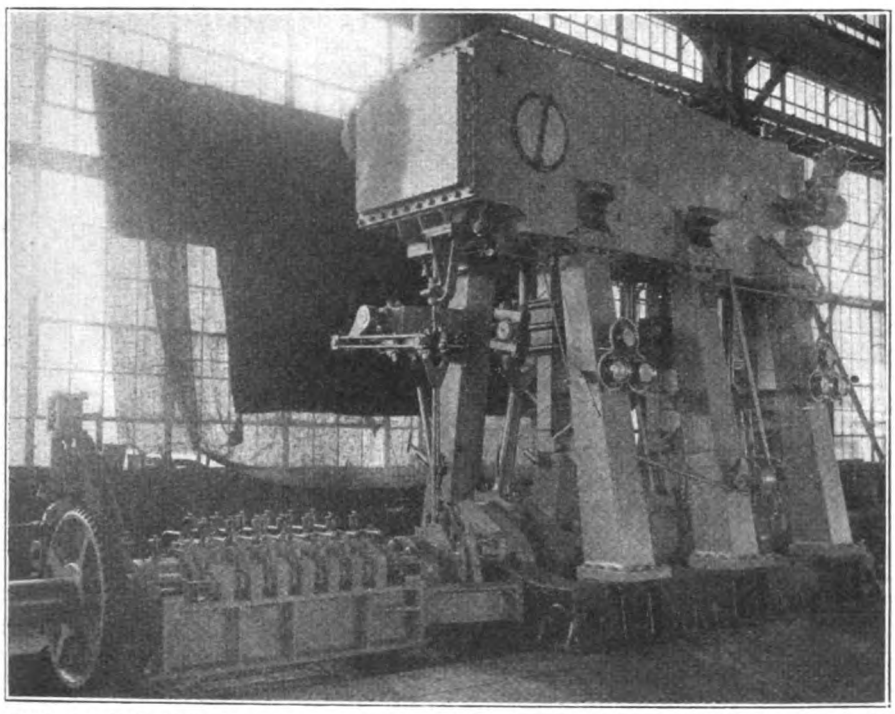
each main engine there is also a hatch in the main deck of sufficient size to permit removal of pistons and cylinder heads. Above the boiler room there are two small hatches one on each side fitted with steel gratings and covers. Above the after end of No. 3 hold two bolted plates are fitted in the main deck, one port and one starboard and of a size to allow removal of shafts from the hold. There is also a hatch on the main deck with stairs leading to the engine room. Access from the car deck to the shade deck is by means of comfortable stairs located approximately amidship on the center line.

Between the main and shade decks there is a complete casing for the uptakes to the stacks and for the boiler room ventilators. Two air trunks are fitted leading from the main deck to above the steel deck house. The trunk to the forward engine room is plated over and has a 24-inch ventilator cowl. The boiler room ventilators four in number 24 inches in diameter are fitted to within 9 feet of the fire room floor and have turning gears operated from the fire hold.



ONE OF THE TWO TRIPLE EXPANSION STEAM ENGINES AND THRUST FOR THE CARFERRY WABASH BUILT BY THE TOLEDO SHIPBUILDING CO.

### A Seagate Is Fitted

To prevent the dashing up of water upon the exposed after car deck a seagate is fitted which is supported on forged bearings. This gate is 60 inches high and may be lifted to clear the cars. A steam winch is used for raising the gate.

A complete steel deck house is located as shown in the accompanying illustration. Generally this house is built of 10-pound plating and stiffened by 3½ x 2½ inches x 6.1-pound angles. Internally the deck house is braced against racking by light steel bulkheads. A small deck house of steel is also located on the after shade deck for enclosing after telegraphs, whistle pulls and steering gear. On the after end of the main deck for a length of about 20 feet there is a 4-inch wooden deck laid on a 1½-inch bed of asphalt on top of the steel deck.

There are six metallic life boats of 25 persons capacity each built by the Welin Davit & Boat Corp. These life boats are served by Steward davits and Damase Jacques boat handling hoists. A complete wireless outfit of Radio Corporation of America type is installed.

There are two steel masts. The fore mast has two shrouds on each side and one fore stay of 2-inch circular galvanized steel wire, two back stays and one top mast fore stay of 1½-inch galvanized steel wire rope all set up on turn buckles attached to decks with suitable pads. The main mast shrouds and stays are of wire and rods set up on turn buckles. The stack guys are of 1½-inch circular steel wire rope set up with turn buckles attached to deck pads.

On the spar deck aft there is a steel derrick complete with mast, boom, sheaves, tackle and hoisting engine with a capacity of five tons. This rig is installed for the purpose of lifting automobiles in a special sling to the spar deck.

The anchor windlass installed forward on the spar deck is of Hyde spur geared type driven by an electric motor of 35 horsepower. Two chain pipes communicate from the windlass to the chain locker. There are two stockless anchors of about 4500 pounds each attached to 1⅞-inch stud link chain cables of 90 fathoms each in 15-fathom shots with shackles. The lower end of these cables are shackled to heavy lugs in the chain locker. On the shade deck forward there is a Benson electric warping winch driven by a 50-horsepower motor. On the main deck there are two steam capstans, furnished by the Manitowoc Shipbuilding Corp. The main steam steering engine and an auxiliary steam engine fitted to the quadrant for use as an emergency unit were both furnished by the Manitowoc Shipbuilding Corp.

### Navigating Equipment and Gyro

The pilot house is sealed with oak and is fitted with windows of heavy plate glass lowering into pockets. The floor is about 27 inches above the steel deck and is covered with linoleum. There is a wood steering wheel on a brass stand which contains the standard compass. There is also a Sperry gyro compass, the first it is understood to be fitted on a lake carferry. The connection between the steering stand and the steering engine is by means of steel shaft carried on roller bearings and fitted with beveled gears. In the after pilot house there is also fitted a wooden steering wheel on a brass stand and connected to the auxiliary steam steerer by shafting and beveled gears.

A fire line of 2½-inch standard pipe is run on each side of the main deck with five 1½-inch hose connection in each line. From these two lines risers of 2-inch pipe are run to the shade deck with four 1½-inch hose connections on each side and also four 1-inch hose connections on each side for deck washing purposes. A complete smothering system is fitted throughout the vessel in accordance with the requirements of the United States steamboat inspection service.

All sleeping rooms, mess rooms, toilets and other living quarters are heated by steam. Radiators are of cast iron except in the pilot house where a brass pipe coil is fitted. All quarters are fitted with plumbing and fresh water connection according to latest lake marine practice. There is a complete bilge and ballast piping system. No. 1 and No. 2 holds have an independent 5-inch suction line ex-



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tending to a manifold in the engine room. There is also an independent 3-inch line from the engine room to the fore peak and similarly a 3-inch line to the after peak. From the engine room manifold to the boiler room and No. 3 and 4 holds there is an independent 5-inch suction line. These lines are of wrought iron pipe fitted with cast iron strainers and are placed as close to the shell at center line as possible and where they pass through watertight bulkheads stuffing boxes are used for water tightness. There is a 10-inch centrifugal ballast pump connected to a manifold from which the bilge and ballast piping leads.

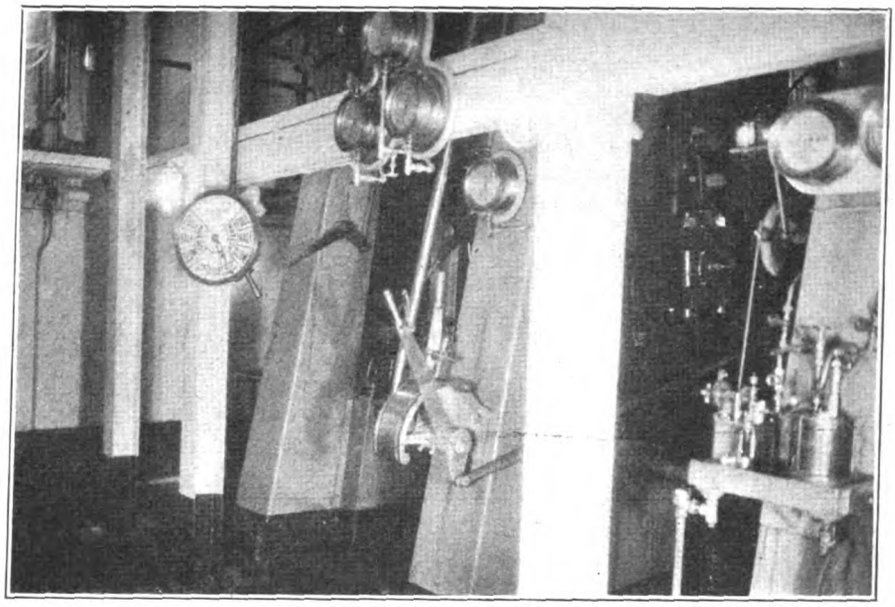
### Three Electric Generating Sets

Electric current is supplied by two 25-kilowatt and one 50-kilowatt Engberg generators. These are installed on the orlop deck in the after end of the engine room. There is a slate switchboard with all necessary instruments and connections. All wiring is run in conduit with watertight connections except in cabins where molding is used.

In the space reserved for cars 25-watt lamps and vapor globes with guards are fitted to stanchions and under shade deck in accordance with usual carferry practice. A number of lights in vapor globes are fitted in engine space, boiler space, holds and windlass rooms. Lights of this character are also fitted around the outside of deck houses. There is also excellent lighting for all quarters and there are connections for operating fans. On top of the pilot house there is fitted a 1000-watt flood light and there are two 750-watt flood lights fitted on the shade deck aft. There is a tell tale board connected to the running lights in the pilot house.

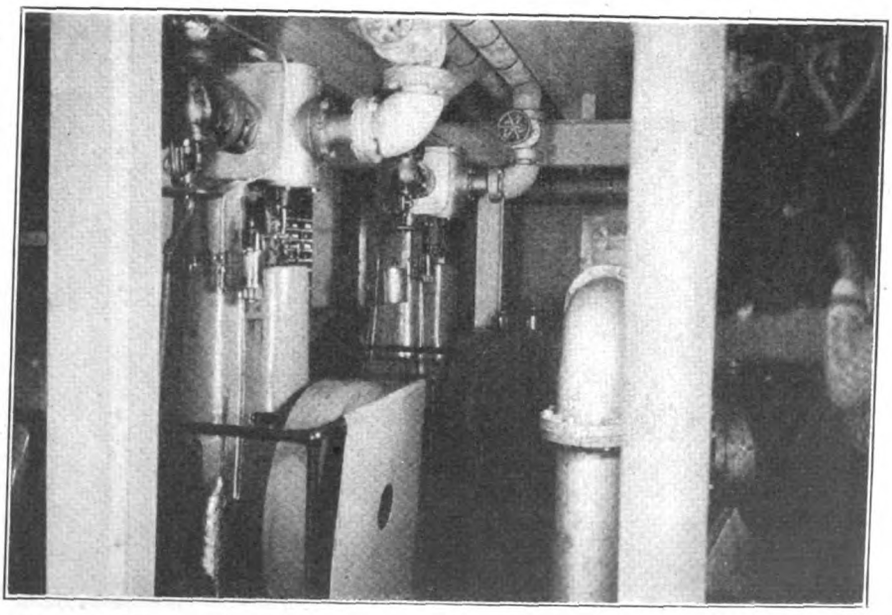
There is a cold storage room built of ¾-inch fir on the outside with layers of water proof paper and two 3-inch thicknesses of compressed cork and an inside ceiling of ¾-inch spruce. Bottom and sides of the box to a height of six inches is lined with 4-pound sheet lead soldered to form a pan and having a suitable drain. There is one 1-ton refrigerating ice machine of Brunswick-Kroeschell type. There is an ice making tank with a capacity of about 100 pounds per day.

Signals and communication system is quite complete. There is a telephone between the lower bridge and the engine room. There is an additional telephone system connecting the captain's and chief engineer's rooms, wireless room and engine room to the pilot house. In the lower engine room there is a telephone booth. Whistle pulls are fitted in the pilot house, both sides of bridge and in aft pilot house for each engine connecting to corresponding whistles located one for each engine. One of these are of chime type. Two reply telegraphs with illuminated dials one for each engine is fitted in the pilot house and two are fitted aft. Both sets are connected to corresponding engine room telegraphs for each engine. There is also a mate's telegraph fitted in aft pilot house and also in forward pilot house. A complete alarm bell system fitted with signs as required by the steamboat inspection service and controlled by a switch in the pilot house is also installed. The entire signaling and communication system on the ship was furnished and installed by Chas. Cory & Son Inc.



PORT ENGINE ON CARFERRY WABASH SHOWING CONTROLS

The exterior of the cabins is of steel. The interior bulkheading and panneling is of Haskelite plywood completely insulted with hair felt, top, bottom and sides. The regular passenger staterooms of which there are 14 in number are arranged with one upper and one lower double berth. There is a lavatory in each stateroom with hot and cold running water. Each stateroom is comfortably equipped. In addition to the ordinary staterooms there are two suites, each consisting of two rooms with shower, lavatory and bath connecting. These suites may be occupied as an apartment or divided into two separate rooms. Two of these rooms have wide lower berths only whereas the



TWO 25-KILOWATT ENGBERG GENERATORS ON UPPER FLAT ENGINE ROOM OF WABASH



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connecting room have standard upper and lower berths.

On the cabin deck forward there is a large well lighted room adjoining the main salon beautifully furnished and finished in silver gray fitted with writing desks and bridge tables. This room serves as a ladies' parlor. The main dining room is a large comfortable attractively finished room with table and chairs for serving meals for passengers. There is a built-in sideboard and the pantry serving the dining room is fitted with lockers shelves and work tables. There is a men's smoking room also finished in gray tones and furnished with comfortable chairs and card tables. The flooring throughout the quarter is of United States rubber tiling of pleasing and harmonious design. Lavatories throughout the ship have ceramic white tile floors. All stateroom floors are carpeted.

While the service is primarily a freight service travelers using this vessel will find all the comforts and appointments of a real passenger ship. No expense has been spared to provide good accommodations and safety for travelers. Auto tourists may drive their cars aboard go on deck and enjoy a beautiful lake trip. Meals are served at regular hours in the main dining room.

The captain's office and stateroom is fitted with a built in berth, built in lockers, bureau, desk, lavatory and setee. The chief engineer's room is fitted with built in berth, lockers, lavatory and desk. The purser's, mates', cooks' and assistant engineers' rooms are fitted with built in berths with drawers underneath, folding desks, lockers and lavatories.

The wireless room is fitted with locker and table for wireless instruments and has a built in desk locker. All other crews' rooms which are located on the shade deck are fitted with pipe berths, lavatories and built in lockers. Deck hands, firemen and coal passers' rooms are fitted with pipe berths and lockers.

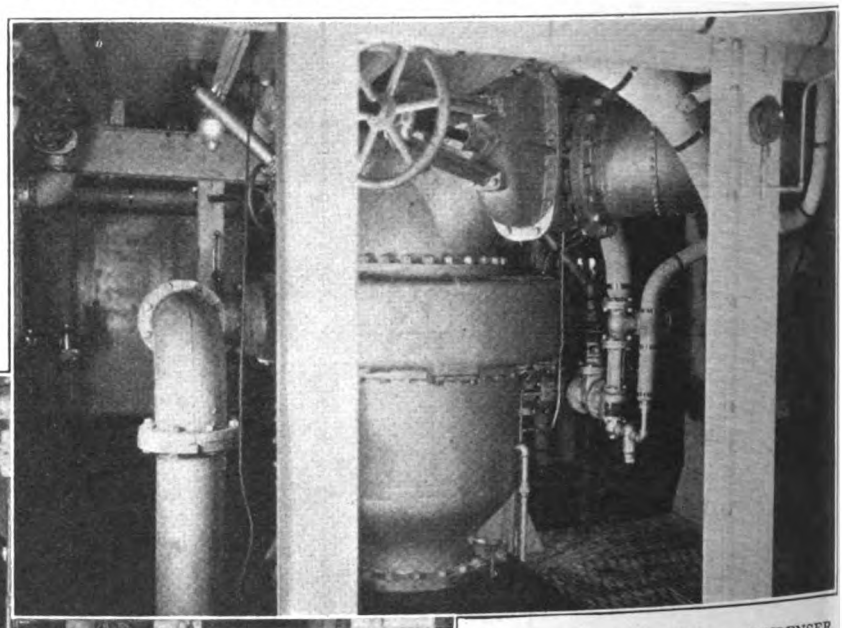
The galley is completely equipped in every respect. There is a double fire box ship's range about 7 feet long fitted with hood, rolling bars and necessary equipment. There is also a large size sink of oak lined with zinc with hot and cold water connections; also a 40-gallon hot water tank, lockers and racks for dishes and tables. The range is a coal burner and a coal box is fitted on the deck outside of galley.

In accordance with the steamboat inspection service requirements there is fitted an automatic fire alarm system and the crews' quarters are fitted with overhead water sprinklers controlled from the engine room. There is also an auxiliary lighting set in accordance with the requirements for vessels carrying passengers.

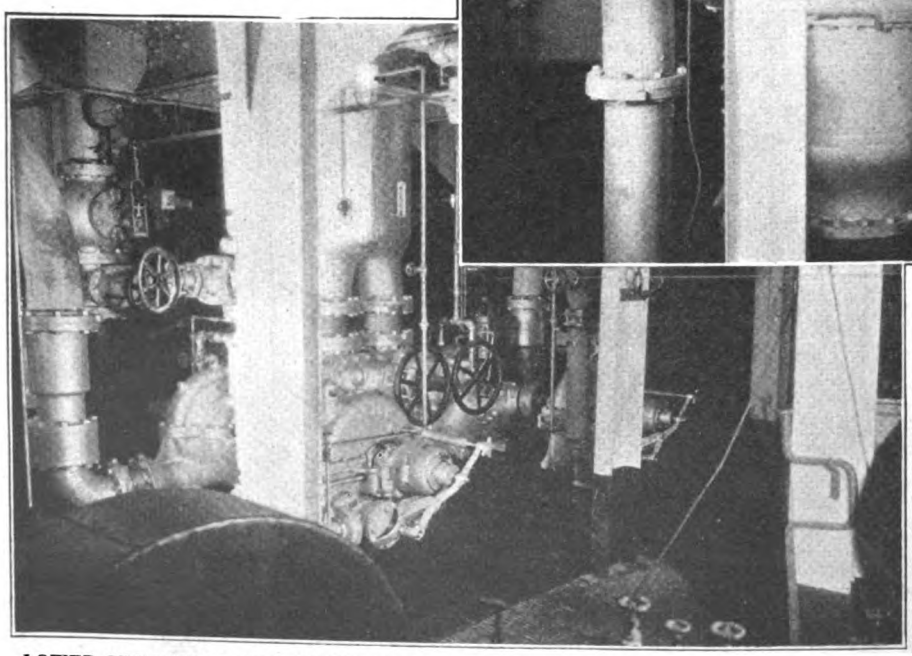
This vessel is propelled by two vertical triple expansion direct acting jet condensing engines with cylinders of 20½ x 34 x 56 inches diameter 36 inches stroke, each direct connected to outboard turning propellers. The total indicated horsepower for both engines is 2750. Steam is supplied to these two engines by four scotch marine type boilers burning coal at 185 pounds working pressure and fitted with Howden system of forced draft as supplied by John Reid, New York. The boilers are 14 feet 6 inches in diameter by 12 feet long and each have 3 Morison furnaces 42 inches inside diameter. There are 430 seamless steel tubes in each boiler of 2½ inches outside diameter. Engines and boilers were all designed and built by the the Toledo Shipbuilding Corp. Inc. The thrust bearing for each engine is built up of cast iron and is of the horse shoe type of heavy construction arranged for proper connection to the after end of the engine bed plates. Each horse shoe is babbitt faced and separately adjusted by means of double composition nuts on heavy steel bolts. The thrust is taken on not less than seven collars with the surface proportioned for moderate pressure under the most severe service conditions. The horse shoes are arranged for water circulation.

Particular attention was paid to the lubrication and cooling systems. Each main engine and all auxiliary machinery are fitted with oil or grease cups and piping. Ratchet oil pumps of Hills McCanna type are fitted for supplying cylinder oil to the main and auxiliary machinery. The bar guides are fitted for water circulation and spray pipes are conveniently ar-

(*Continued on Page 50*)



WHEELER LOW LEVEL CONDENSER



LOWER SECTION OF THE WHEELER STEAM JET CONDENSER AND TERRY CENTRIFUGAL CONDENSATE PUMP ON THE CARFERRY WABASH



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# *Pulverized Coal Is Installed on Large Ocean Freighter*

PERHAPS nothing the shipping board has done from the time it was created in 1916 has been received with so complete unanimity of approval as the experiments carried out to demonstrate the practicability of burning pulverized coal and the actual installation of such a system in the S. S. MERCER. Not a voice has been found, not even among the diesel engine converts, objecting to the shipping board's "extravagant" use of public funds in this experiment. Everyone is of a mind that it has been a splendid, original, creative and extremely valuable work. All honor is due to those individuals, who even three years ago advocated the study of this important problem. In this connection may be mentioned Capt. A. C. McAllister, chairman of the fuel conservation committee of the shipping board, C. E. Jefferson, head of the same committee, and Capt. R. D. Gatewood, manager of maintenance and repair for the shipping board, for the encouragement and free hand which he has given those who have done the work. Commander J. S. Evans of the navy, in charge of the fuel testing station at the navy yard in Philadelphia, also deserves the highest credit, as he has co-operated in a very energetic manner.

### Practical Installation on Mercer

After having witnessed the installation on the S. S. MERCER as she lay under steam and turning over her main engines at full speed, burning pulverized coal, it is difficult to adequately express full appreciation for the work accomplished. Everything is simple and convenient. There is no appreciable dust, dirt or noise and no congestion. The MERCER is a shipping board vessel built by the Federal Shipbuilding & Dry Dock Co., Kearny, N. J., delivered in January 1919. She is of 9730 deadweight tons; 395 feet 6 inches in length between perpendiculars; 55 feet in beam; 34 feet 11 inches in depth, and her loaded, summer draft is 27 feet ¼-inch. There are three scotch boilers rated at a pressure of 210 pounds per square inch with a total heating surface of 8934 square feet. The main drive is a General Electric turbine and reduction gear of 2480 shaft horsepower. The bale cargo capacity was originally 456,280 cubic feet. This vessel was to begin with an oil burner and had an oil fuel capacity in permanent bunkers of 1568 tons. The normal sea speed in knots was 10.5 and the estimated daily fuel consumption in tons of oil was about 33.1.

### From Baltimore to New York

After the experiments of burning pulverized coal in scotch boilers at the fuel station in the navy yard in Philadelphia had progressed to a point where there was no further doubt in the minds of all those familiar with the results, it was recommended to the shipping board that a good sized ocean freighter be fitted out to burn pulverized coal. This recommendation was accepted by the shipping board and the S. S. MERCER was chosen for the trial installation. Bids were received from a number of shipyards to carry out this work. The bids varied from that of the Maryland Dry Dock Co. at $36,498 to that of the Bethlehem Shipbuilding Corp. at $87,400. No less than 11 bids were received. The Maryland Dry Dock Co.'s bid was accepted by the board on Sept. 13, and the vessel was immediately sent to Baltimore and the work commenced.

On Nov. 4 the S. S. MERCER, completely converted to burn pulverized coal, sailed in light condition from Baltimore to New York. She arrived in New York, Nov. 6, after approximately a 36-hour run. The average speed from pilot station to pilot station for the entire run was 10.8 knots. The amount of coal burned for all purposes on the voyage from Baltimore to New York was carefully checked by responsible officials on board and a figure arrived at. This figure was so remarkably low that it was feared that some error had been made in figuring the amount used and it was decided not to make it public. However, from indications during dock tests and during this sea run it is likely that the coal consumption burning pulverized coal will not be much greater in weight than the former consumption of fuel oil which as stated above was in the order of 33.1 tons per day.

On the MERCER oil fuel has been retained as an auxiliary and for use should emergency require. In the run from Baltimore the fires were lit off on oil and then shifted to coal and kept on coal all the way including all maneuvers carried out in the harbor, until arrival in Hoboken, N. J. The allowable steam pressure is 210 pounds and it did not fluctuate more than five pounds. Only two boilers of the three were necessary to give ample steam for wide open throttle to the turbine.

The pulverized coal installation on the MERCER is the system developed at the Philadelphia navy yard fuel testing station. Going down below, the engine room of the MERCER remains the same as that of all other vessels of her class. In the boiler room are the usual three scotch boilers each with three furnaces. On either side just forward of the fireroom-hold bulkhead is a recessed space which contains a pulverizing mill of the air swept ball type as designed by Kennedy-Van Saun Mfg. & Engineering Corp. In this particular installation one mill is used per boiler but the capacity of one mill is enough for two boilers as it will deliver 3600 pounds of coal per hour.

### Fineness of Coal Is Important

Coal to the mills is delivered by gravity from crushers located on the deck above, the coal being crushed to about 1¼-inch size. In the mill it is pulverized so fine that 85 to 90 per cent will pass through 200 mesh and so that 100 per cent passes through 50 mesh. Great stress is laid on the super-fineness of the coal, which is, in fact, to the touch, comparable to the fineness of talcum powder. From the mills the pulverized coal is blown in pipes with branches into the respective furnaces. On the way through the main pipe this coal meets a distributor which equalizes the amount for each main branch to each boiler. Another distributor in each branch equalizes the amount to be delivered to each furnace. The development of the distributor has had an important bearing on the success of the installation.

Each branch pipe of perhaps four to five inches in diameter is brought

(*Continued on Page* 52)



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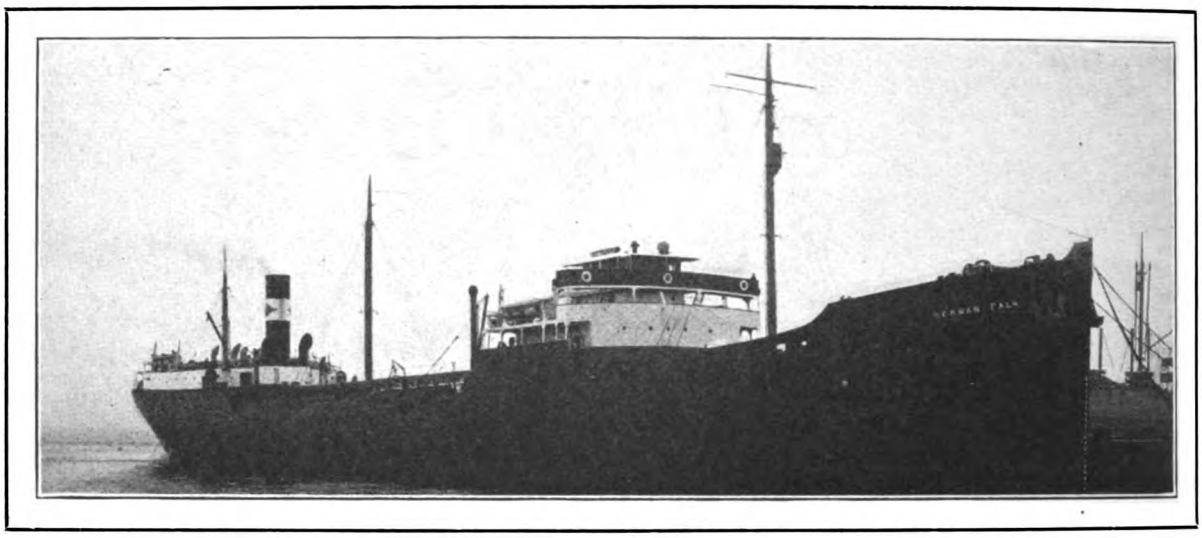


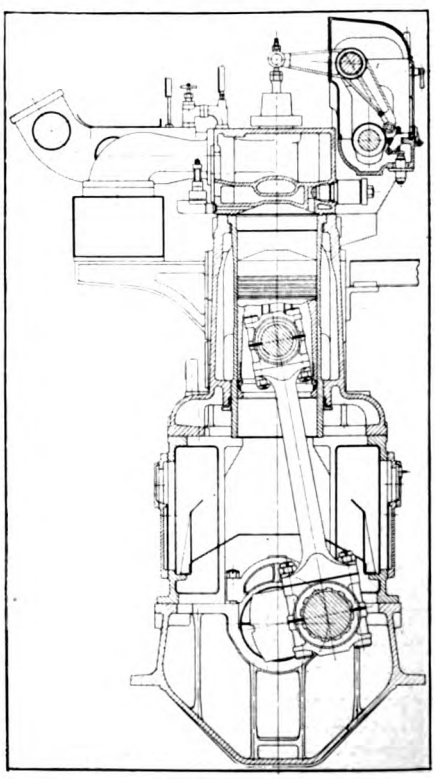
*Tanker Herman Falk—Single Screw—Twin Geared Diesel Drive—Owned by Oil Transport Co.*

# Geared Diesel Drive Installed

## Two 8-Cylinder Engines Geared to Single Propeller Shaft in Tanker Herman Falk—Vessel in Service Operates with Success

IN ORDER to obtain maximum propeller and hull propulsive efficiency it is necessary to keep the propeller revolutions comparatively low. In other words for the usual type of cargo ship, if it were conveniently possible to do so, the ideal number of revolutions would be between 70 and 80. For a direct connected drive it is not possible for certain types of motive power to keep the revolutions at so low a point. This obviously applies with great force to the turbine. It also applies with much less force to the diesel engine. However, the builders of diesel engines recognizing the requirements of the naval architect have turned out slow speed engines in order to furnish power to the propeller at speeds that will approximate maximum efficiency.

The road to reduction in weight and higher engine efficiency unquestionably lies along the line of increased speed. This is clearly demonstrated by the wonderful development of internal combustion engines for the automobile and the airplane. As long as the marine engine builder is restricted to the comparatively low revolutions for his engine which is required for maximum propulsive efficiency when it is direct connected to the propeller there is little opportunity to reduce weight and to improve the efficiency of the engine itself. Consequently in order not to restrict either the engine builder or the naval architect in their respective requirements much work has been done in developing means of speed reduction between the engine and the propeller. A number of vessels, from small river boats to ocean tankers have been fitted with diesel electric drive where comparatively light high speed engines are direct connected to electric generators. The current so generated is then applied to an electric motor direct connected to the propeller. In this case a very definite variation of speed is possible for the propeller and it can be arranged to have maximum power delivered at ideal propeller revolutions.



CROSS SECTION—FALK DIESEL ENGINE

### A Practical Reduction Gear

Though possessing many advantages, there are certain objections to the use of electric power in this manner solely for speed reduction. In other words engineers recognize that if it were possible to obtain speed reduction by mechanical means of absolute reliability that this would serve the purpose where the matter of speed reduction alone is the determining factor. It was to solve this problem that the Falk corporation with many years of experience in gear design and construction after a long period of study and preliminary development work offered the interesting twin diesel engine reduction geared drive now installed and in service in the tanker, HERMAN FALK, owned by the Oil Transport Co., Baltimore.

The work was carried out at the Sparrows Point plant of the Bethle-



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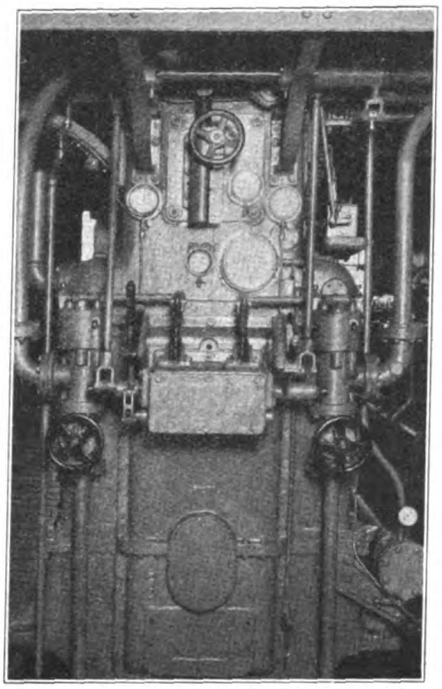
hem Shipbuilding Corp. The HERMAN FALK was the ex-TUXPANOIL a steam turbine geared oil burning tanker built by the Baltimore Dry Dock & Shipbuilding Co. and delivered to the shipping board early in 1921.

This vessel was sold to the Oil Transport Co. by the shipping board in 1926 with the stipulation that she should be converted to diesel drive and to continue in the highest class of the American bureau. For the owner the work of conversion was planned and supervised by Charles R. Ross, naval architect, New York. Though the contract called for the work of conversion to be completed in 117 days, the Sparrows Point plant receiving the vessel on May 10, offered the vessel for trial August 19, fifteen days ahead of contract time. The trials were successfully held on that day and on the following day the vessel sailed from Baltimore for Texas and after loading sailed on her return voyage to Baltimore, August 29. This tanker has been in regular operation since.

### Two Engines Geared to Shaft

The power plant of the HERMAN FALK as shown in accompanying illustrations consists of two, eight cylinder, four cycle, solid injection



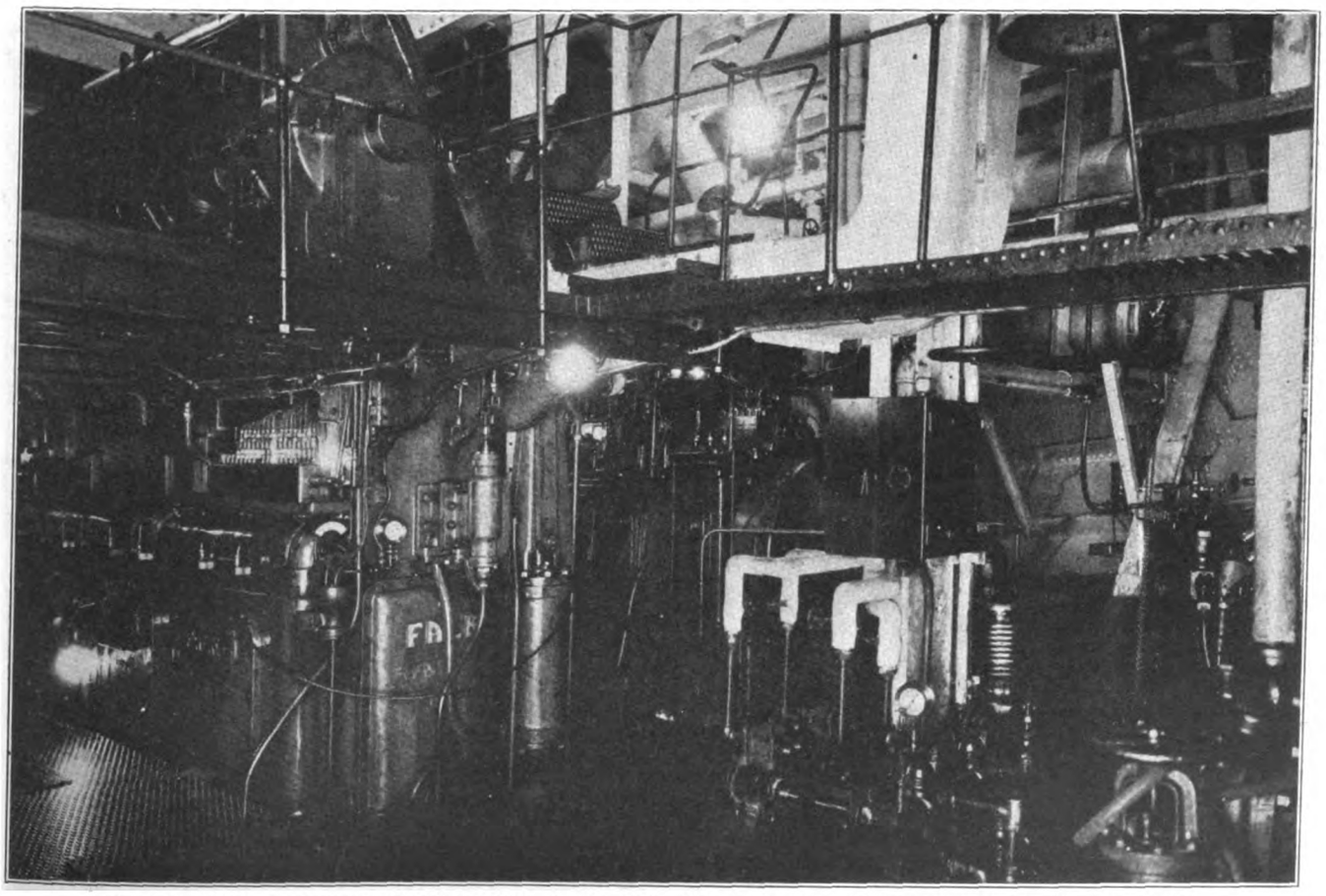
AFTER OR FREE END OF PORT ENGINE OF TWIN GEARED FALK UNIT—SHOWING REVERSE CONTROLS

Falk oil engines each of 1300 brake horsepower at 275 revolutions per minute. The engines are set parallel fore and aft and at the forward end is located the reduction gear. Each engine is connected by means of Falk flexible couplings to a pinion which meshes on opposite sides with one common low speed gear. As can be seen from an accompanying illustration the center lines of engine crankshafts, pinions, slow speed gear and propeller shafting are all in the same plane. The line shafting which is connected to the large gear passes aft between the two engines.

The engines have been quite completely described in the November issue of MARINE REVIEW and elsewhere. They are of the airless injection type and the fuel is driven into the compression space with short sharp hammer blows. The injection pumps are of especially rugged design and are located to give shortest possible lengths of injection piping. The twin geared units have an interesting common starting reversing and fuel control arrangement. There are two starting air levers, one for each engine, and it makes no difference if they are operated simultaneously or separately.

### Bearing Pressures Offset

It is interesting to note that from an engineering point of view the bearing pressures on the low speed gear shaft due to piston thrusts offset each other at all times in spite of the fact that there is a consid-



ENGINE ROOM TANKER HERMAN FALK—AFTER END OF STARBOAD ENGINE OF TWIN GEARED UNIT



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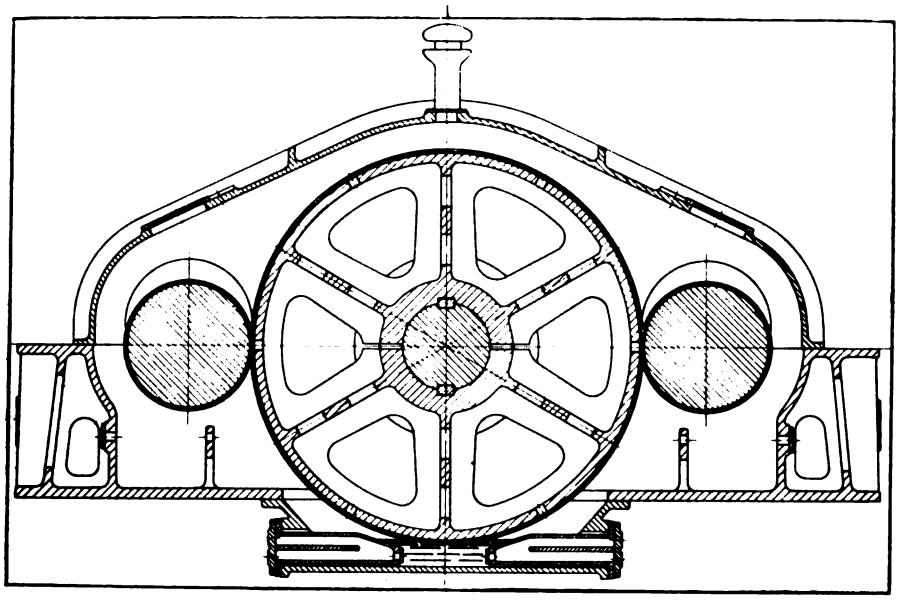


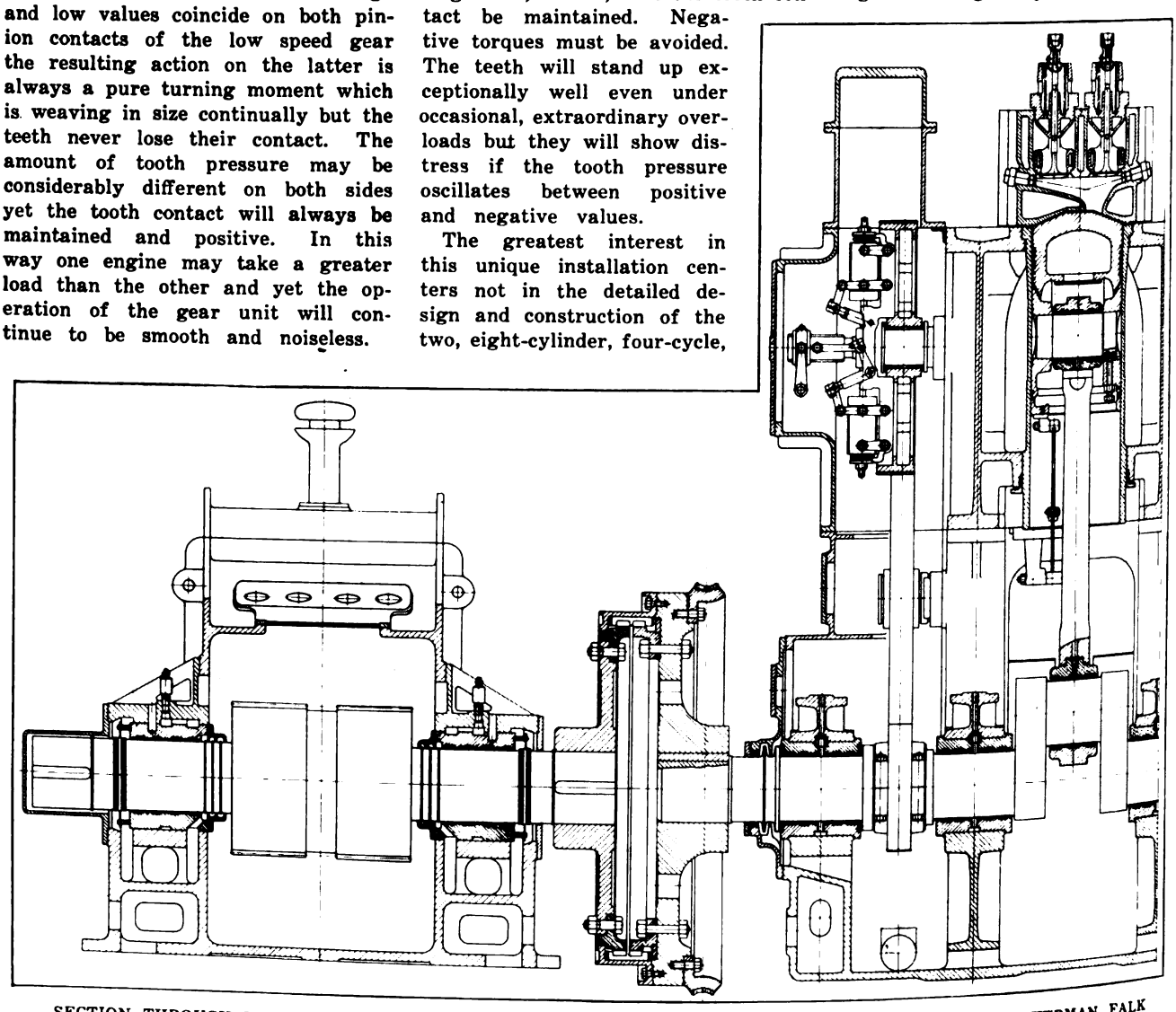
ATHWARTSHIP SECTION THROUGH GEARS ON THE HERMAN FALK

erable variation of the torque during a revolution. A high peak of the torque is reached four times during every engine revolution with low values of only about 10 per cent between two peaks. But as the high and low values coincide on both pinion contacts of the low speed gear the resulting action on the latter is always a pure turning moment which is weaving in size continually but the teeth never lose their contact. The amount of tooth pressure may be considerably different on both sides yet the tooth contact will always be maintained and positive. In this way one engine may take a greater load than the other and yet the operation of the gear unit will continue to be smooth and noiseless.

For smooth vibrationless and noiseless operation of the geared unit, it is essential first, that the maximum tooth pressures on both sides of the low speed gear be of about the same magnitude, second, that the tooth contact be maintained. Negative torques must be avoided. The teeth will stand up exceptionally well even under occasional, extraordinary overloads but they will show distress if the tooth pressure oscillates between positive and negative values.

The greatest interest in this unique installation centers not in the detailed design and construction of the two, eight-cylinder, four-cycle, comparatively high-speed oil engine. It may be taken for granted that the engineering skill and practical experience of the staff of the builder is sufficient guarantee that these engines will compare favorably with other similar types. The main interest of this installation lies undoubtedly in the application of a practical gear reduction for reciprocating oil engines.

Most engineers apparently have a natural prejudice against the application of gearing in connection with reciprocating engines. It is reasonable however to assume that in this instance where the builder is well known as a specialist in gearing for reduction drives that the installation supplied to the HERMAN FALK will prove to be entirely reliable and efficient. There are certain reasons for this belief based on experience. In his own plant the builder has a generating unit driven by four, 4-cylinder diesel engines of a combined power of 2200 brake horsepower driving a generator through reduction gearing. The engine speed in this case



SECTION THROUGH MAIN GEAR PINION, FALK COUPLING AND 8-CYLINDER DIESEL ENGINE ON THE HERMAN FALK



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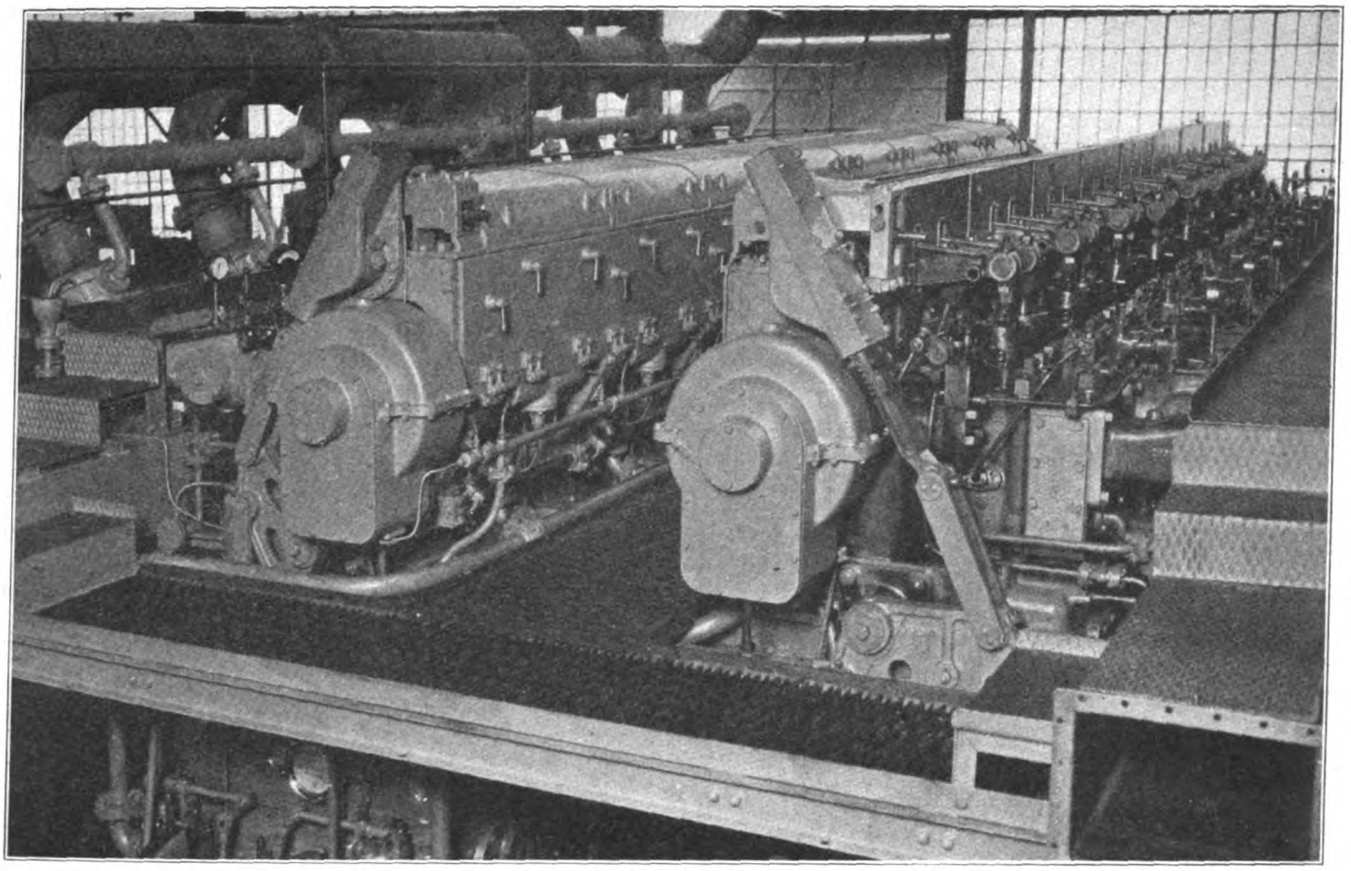
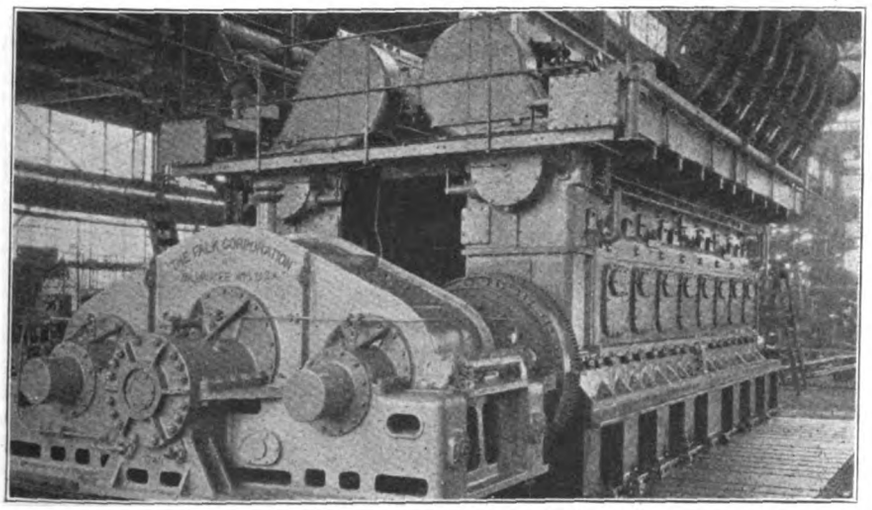


THE HERMAN FALK'S TWIN GEARED 8 CYLINDER DIESELS IN SHOP. LOOKING FROM FREE END

is 200 while the generator speed is 90 revolutions per minute. The gear unit used is very nearly the same as that on the tanker HERMAN FALK. The helix angle of 30 degrees and the diameter pitch of 2 d.d. and the same in both cases. This power house unit has been running steadily for five years and the gear unit has cost nothing in upkeep during this period and there is no sign of wear on the geared teeth or journals.

From his experience with this unit the builder is no longer concerned about the gear. It has come down to the same status as a common mill gear of which this company builds hundreds every year. It has been stated by an actual observer that the gear unit on the HERMAN FALK is soundless and without vibration. The natural impression would be gained after seeing it and feeling of it when running, that it is indestructible. Even when running at 90 revolutions it gives off no sound nor the slightest tremor. A coin was successfully balanced on one of the nuts of the cylinder blocks while the unit was in operation.

Any difficulties experienced by the Germans in the application of reduction gearing to the diesel engine has no relation to the installation described in this article. There are fundamental differences between the German and American gears. Gears cut for instance by Blohm and Voss are of turbine reduction type with fine pitch and oil spray lubrication. The American gears, as installed at the plant of the builder and on the tanker HERMAN FALK are as mentioned above of the usual rolling mill type, lubricated by a semifluid lubricant. In this particular case this lubricant is known as Crater compound. The peripherial velocity is low and the entirely reliable compound lubrication gives practically an absolute protection to the gear teeth. With the experience of the power house gears which in five years of operation do not show a wear of more than 0.001 inch the builder expects to see the gears on the HERMAN FALK outlive the ship. There is another important point in connection with gear drive. It is possible in this way to maintain control of the critical speed.



THE SAME UNIT FROM THE FORWARD OR REDUCTION GEARED END

The space occupied by the twin engine geared installation will come within a block 14 feet 2 inches high, 39 feet 2 inches long and 14 feet 1-inch wide. This represents the extreme overall dimensions. The

(*Continued on Page* 52)



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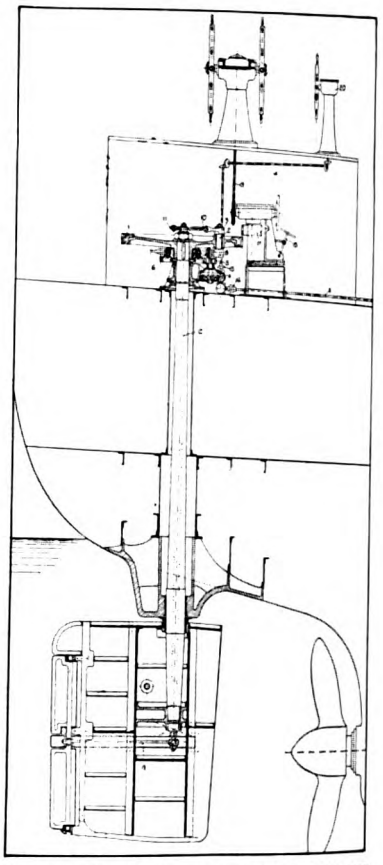
# Rudder of New Type Is Tested on U. S. S. Converse

THE United States navy in developing the design and construction of vessels of all types for its own purposes has contributed much of direct value to the merchant marine. In line with this policy it has pioneered in experimenting with devices which if proven suitable for its own use are entirely adaptable for merchant ships. It is therefore, not surprising that the navy department authorized the installation of the Flettner rudder on a destroyer. After having demonstrated the practicability of this rudder on a sub-chaser it was decided to install a full size rudder on the U. S. S. CONVERSE. This installation was made last April and it has been in continuous operation since.

Through the courtesy of the secretary of the navy, at the request of the American Steamship Owners association, the CONVERSE was ordered to New York for purposes of demonstrating the practical operation of this rudder. On Oct. 7, a group of shipping men witnessed an actual demonstration on the destroyer in New York bay in the neighborhood of Ambrose lightship. The U. S. S. CONVERSE was in command of Lt. Commander Wells E. Goodhue, U. S. N. Lieut. Thomas F. O'Brien, C. C. U. S. N. who had been directly connected with the installation of the rudder explained its operation.

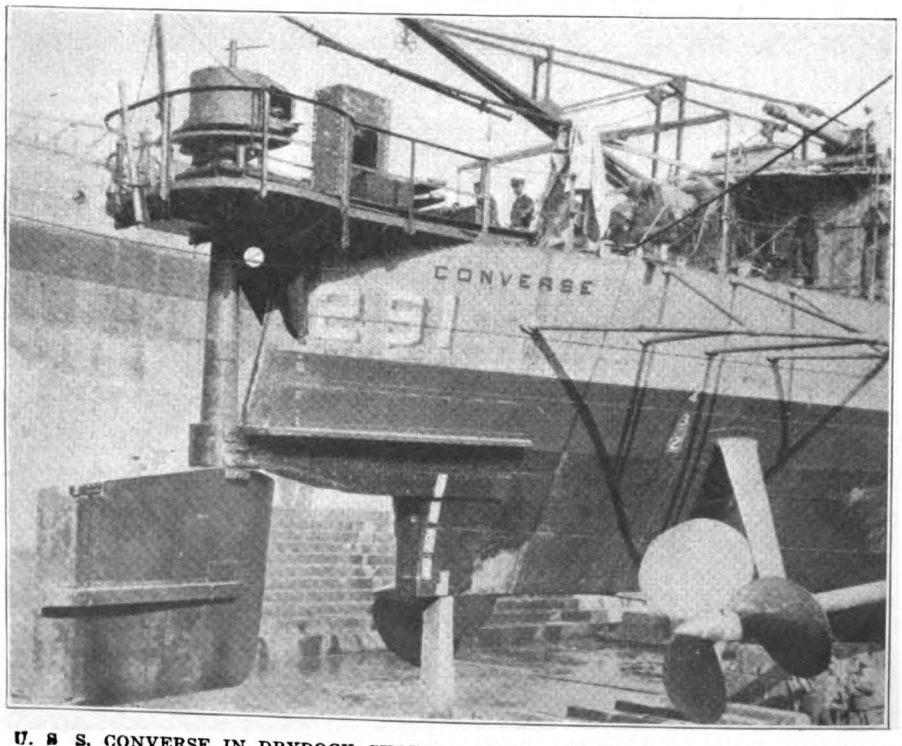
For the purposes of the trial the commander of the CONVERSE put the vessel through the following evolution: Rudder hard over, right and left at 15, 20 and 25 knots, speed respectively, slowing down to a speed of 1 knot to show the maneuvering ability of the rudder at this speed; backing up, going astern at 5 and 15 knots. From reports received these maneuvers showed that the ship was always under perfect control and that this new type of rudder is more sensitive and quicker acting than the old style. At full speed the rudder was put hard over in five seconds and the turning circle of the ship was reduced about 35 per cent. The U. S. S. CONVERSE is the first American vessel equipped with the Flettner rudder. Abroad however, it has been successfully installed on practically every type of craft, motorboats, river barges, river towboats, (both paddle and screw propelled), freighters, liners up to 9000 tons, ferry steamers and naval vessels of various nations.



SECTIONAL VIEW OF FLETTNER RUDDER FITTED ON THE M. S. SORRENTO

The accompanying illustrations indicate the general principles of the rudder. It is in fact the steering of the main rudder by means of a small auxiliary rudder in the same way that the hull of the ship is steered by the usual rudder. The main rudder is perfectly free to swing about its turning axis and it will therefore, at any given moment, assume a neutral position with respect to the current if it were not controlled by the auxiliary rudder or the so-called Flettner finn, which is attached to the trailing edge of the main rudder. This finn is small in area compared to the main rudder, is hinged to and may be swung into any desired angle with respect to the main rudder by means of the usual mechanism which transmits motion from the wheel on the bridge to the rudder shaft. A rotable shaft inside the hollow main rudder stock, by means of yokes and rods enclosed in the hollow stream line main rudder, transmits the desired motion to the finn. The finn area being but a

(*Continued on Page* 54)




U. S. S. CONVERSE IN DRYDOCK SHOWING INSTALLATION OF FLETTNER RUDDER



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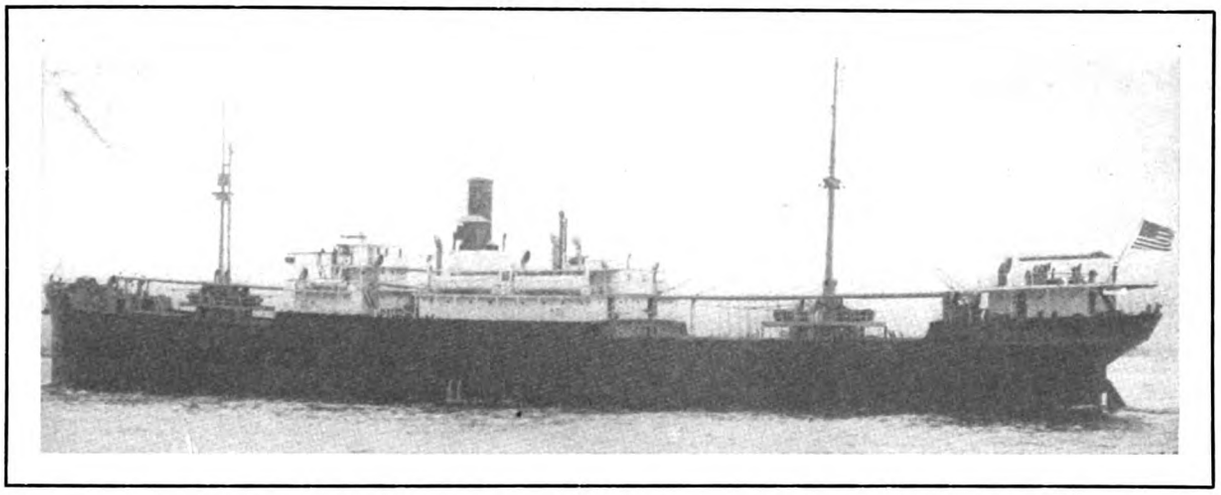

*M. S. Seminole—Double Acting Hooven, Owens, Rentschler Diesel—Converted at Todd's Tietjen & Lang Plant*

# M. S. Seminole With D. A. Diesel Made Good Speed on Sea Trials

By H. R. Simonds

ON OCT. 27 the SEMINOLE, latest vessel to be dieselized in the government's conversion program, started off in the early morning with nearly 150 guests aboard for her official sea trials. Eight or nine hours later she returned to the Brooklyn army base having set a new speed record for this class of converted ship. The day was fine, being sunny, warm and calm, with a slight haze. Calculations based on a run of about two hours gave a speed of 13.6 knots. At the end of the trials it was announced that the vessel had attained a speed of 14 knots, which is a new high record for converted vessels of her class.

The hull and auxiliary equipment is similar to that of several previous vessels of the conversion program which have been described in MARINE REVIEW. The deck arrangement differs somewhat because the SEMINOLE is a freighter without passenger accommodations. The chief distinguishing feature is her main power plant, which is a double acting two cycle diesel engine of the M. A. N. type, built by Hooven, Owens, Rentschler Co., Hamilton, O. This is the first large M. A. N. type of diesel engine to be put into marine service in this country and is believed to be the largest double acting marine diesel engine in operation in the American merchant marine.

The history of the development of this engine is a record of unusual business courage and initiative coupled with exceptional skill in design and construction. Some credit for the achievement must go, of course, to the German builders of M. A. N. diesel engines and much credit is due the shipping board officials who backed the American builders. Henrik Greger, chief engineer of the Hooven, Owens, Rentschler Co., is responsible for adapting the design from the original.

As to just which man had the first idea that it would be well to build large marine M. A. N. type engines in this country is difficult to say. It is known, however, that officials of the Hooven, Owens, Rentschler Co. conferred with officials of the shipping board in 1923 and that during that same year representatives of both of these organizations were in Europe studying diesel engine design. In 1924 the Hooven, Owens, Rentschler Co. secured from interests in Germany license to build large M. A. N. type diesel engines at their plant in Hamilton, O. Contracts with the shipping board followed. A remarkable feature of the negotiations at this point was the fact that the prospective builder had no plans to show nor any precedent to point to in the manufacture of diesel engines. The work of building these new diesel engines started at Hamilton without any hubbub or excitement such as might have been expected. No new department was created and little new additional equipment was added. Gradually the new engine commenced to take form. The greater accuracy required in the construction of certain parts of the engines over the accuracy called for in many stock products of the plant was readily secured. Experienced machinists, told to work to 0.001 inch instead of 0.01 inch as in the past, calmly met the new requirements and seemed to share the manager's eagerness and enthusiasm.

At length the first of the new engines, the one which is now in opera-

**TABLE I**

**General Characteristics of Vessel**

| | |
|---|---|
| Length over all, ft., ins. | 416—0 |
| Length, B. P. P., ft., ins. | 402—0 |
| Beam molded, ft., ins | 54—0 |
| Depth molded at side to shelter deck, ft., ins | 33—9 |
| Displacement at normal mean load draft, tons | 13,010 |
| Gross tonnage, U. S. | 5,868 |
| Net tonnage, U. S. | 3,673 |
| Normal mean load draft, ft., ins. | 26—10¾ |
| Deadweight in tons on mean load draft | 9,235 |
| Bale capacity, not including deep tanks, cu. ft. | 447,800 |
| Capacity of deep tanks—salt water, tons | 1,051 |
| Capacity of fuel oil tanks, tons | 760 |
| Normal speed, service conditions, knots | 12.5 |



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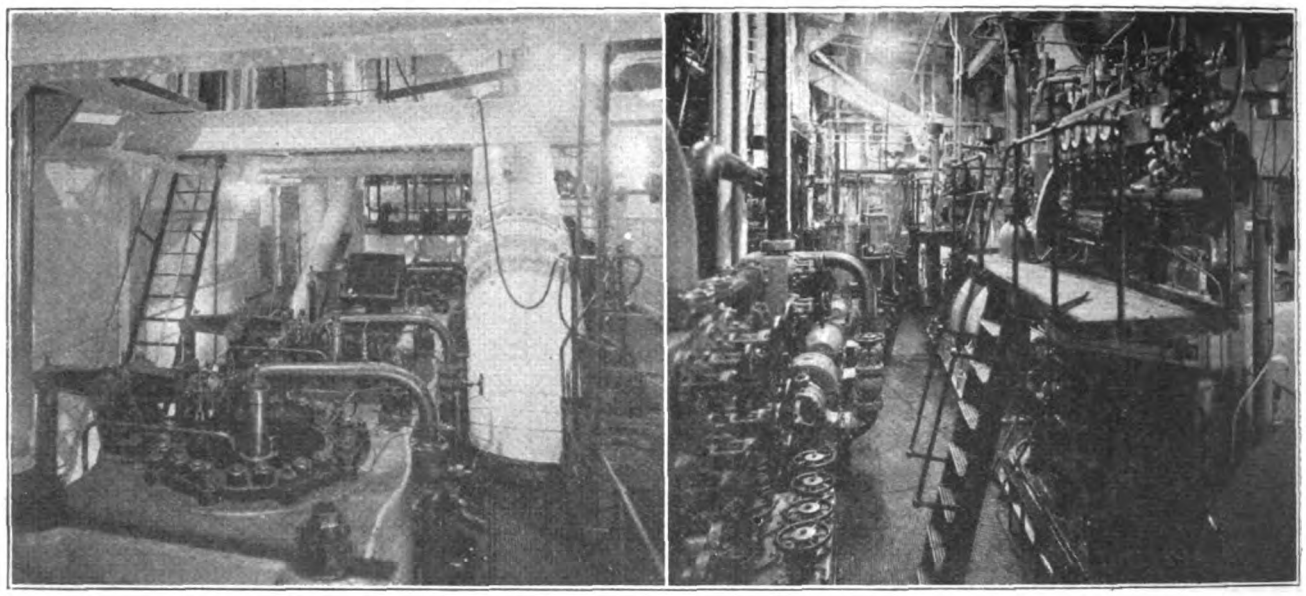


ENGINE ROOM M. S. SEMINOLE—AT LEFT—TOP OF CYLINDERS MAIN ENGINE, LOOKING FORWARD—AT RIGHT—LOOKING AFT ON PORT SIDE SHOWING TWO OF THE THREE 75 K. W. DIESEL ENGINE GENERATING SETS

tion in the SEMINOLE, was completed and given its official 30 day test. Records of this test have already been described. Prominent engineers have expressed amazement at the success attained in this first highly specialized product in an entirely new field.

To the nontechnical observer on the trial test of the SEMINOLE two things must have been apparent. First, the extreme freedom from vibration at full speed, and second, the compactness of the engine itself and the general order and roominess in the engine room.

**TABLE II**

**Oil Consumption and Speed M. S. Seminole**

| | |
|---|---|
| Propeller R. P. M. | 107.49 |
| Main engine B. H. P. | 3546 |
| Main engine I. H. P. | 4676 |
| Mechanical efficiency | 76 |
| Fuel consumption per hour in pounds | 1549.98 |
| Fuel per B. H. P. per hour | 0.437 |
| Average oil temperature, F° | 79 |
| Checked mileage by engine one hour | 12.76 |
| Miles by ship | 12.70 |
| Slip | 0.05 |

### Shallow Water For Trials

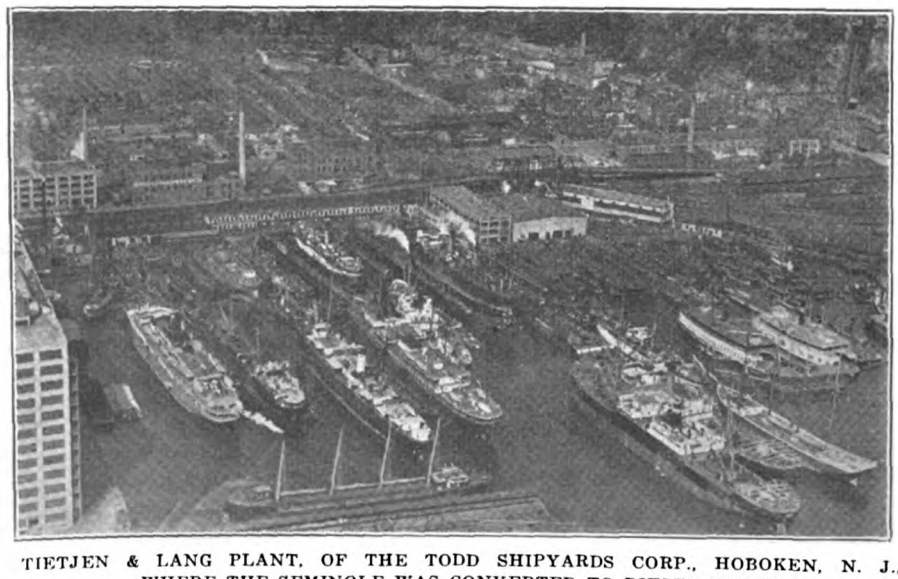
Although the day was perfect from the standpoint of the guests, the haze interfered some with observations and the water for the test was too shallow for best operation of the vessel. This was the first trial under the government's dieselized vessel program to be made out of New York harbor and the handicap of shallow water had not been appreciated. It was found impossible within the limits of one day to reach water in excess of 80 feet in depth for the test run and part of the trial run was conducted at a 40-foot depth. Making due allowance for these two handicaps the test was highly successful.

The SEMINOLE was built in 1920 by the Oscar Daniels Co., Tampa, Fla., and was originally powered with triple expansion steam engine and water tube boilers burning fuel oil. Her estimated speed with this equipment was 10½ knots. By the conversion to diesel engine drive it is estimated that the speed has been increased by about two knots. The oil consumption for all purposes averaged well in comparison with other previously commissioned dieselized ships in this same program. The fuel oil gage reading at the start of a full speed test at 11 o'clock in the morning was 2283 gallons. At 11:30 it was 2192. At 12 it was 2058, and at one o'clock it was 1834. This gives an oil consumption of 224 gallons per hour. The official average for the test was 218 gallons per hour of 1549.98 pounds. The oil was considered a little light by the trial officials. It

**TABLE III**

**Temperatures and Pressures During Trials of M. S. Seminole**

| | |
|---|---|
| Temperature of sea, F° | 59 |
| Temperature outlet from cooler | 64.8 |
| Tempearture of water from engine to cooler | 84.4 |
| Temperature of water from cooler to engine | 65.8 |
| Temperature of main exhaust pipe | 196.8 |
| Temperature of jacket cooling discharge | 105 |
| Exhaust temperature—cylinder 1 | 288 |
| Exhaust temperature—cylinder 2 | 265 |
| Exhaust temperature—cylinder 3 | 283 |
| Exhaust temperature—cylinder 4 | 284 |
| Oil temperature | 79 |
| Temperature of first stage outlet | 265.8 |
| Temperature of second stage inlet | 85.8 |
| Temperature of second stage outlet | 332 |
| Temperature of third stage inlet | 82 |
| Temperature of third stage outlet | 375.6 |
| Pressure of starting air, lbs. per sq. in. | 331.6 |
| Pressure of scavenging air, lbs. | 2.3 |
| Pressure h.p. injection air, lbs. | 1026.7 |



TIETJEN & LANG PLANT, OF THE TODD SHIPYARDS CORP., HOBOKEN, N. J., WHERE THE SEMINOLE WAS CONVERTED TO DIESEL DRIVE



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showed a Baume gravity of 34 and tested 19,530 B.t.u.

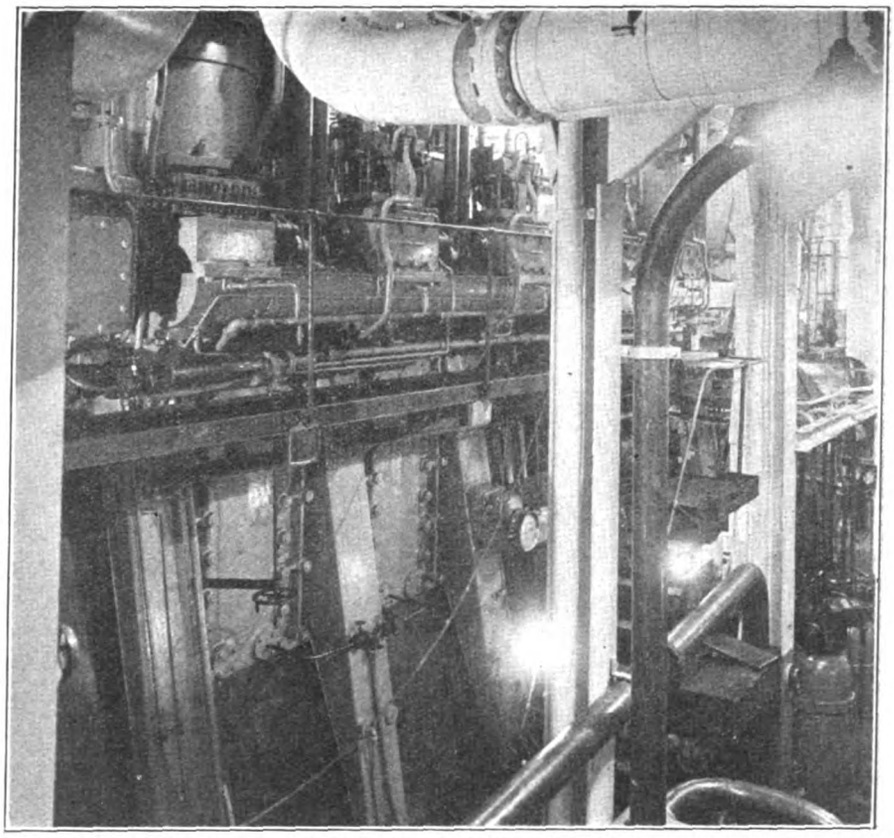
Unlike most other shipping board dieselized ships, the SEMINOLE is an out and out freighter without passenger accommodations. Otherwise, its equipment is even more complete than many of its predecessors. It is provided with modern gyro compass room and equipment, and comfortable quarters for engineers, electrician, motormen, stewards and others. The galley equipment includes a modern oil burning range, electric refrigerator, electric water heaters and other electric apparatus.

### Double-Acting Two Cycle

The main engine is of the double acting two cycle type. It has four cylinders, each 27.55 inches in diameter with a stroke of 47.25 inches. Its cooling system is arranged for salt water with the exception of the pistons, which are fresh water cooled. Its auxiliary equipment follows closely the lines of other ships in this program. This includes three Worthington Pump & Machinery Corp.'s three cylinder, 115 horsepower diesel engines for driving generators. The pistons of these engines are oil cooled.

The main engine housing rests on a bed plate and in turn supports the lower entablature, to the upper face of which is set the cylinder columns which tie into the upper entablature. The upper as well as the lower entablatures is of heavy cast iron section extending the length of the engine. The four cylinders are separated in pairs and the air compressor is located in the center space. An ingenious method of reversing is employed. A movement of a lever causes, by means of oil pressure, the disengagement of one set of cams and the substitution of the reversing set. The arrangement of the fuel valves for marine diesel engines has been the subject of much investigation and discussion among marine engineers. Particular attention has been devoted to the avoidance of eddy currents and conflicting flow in the fuel valves of the SEMINOLE engine.

During the test, following previous custom, the guests were admitted to the engine room in groups of 15 or 18 at a time. In addition to this

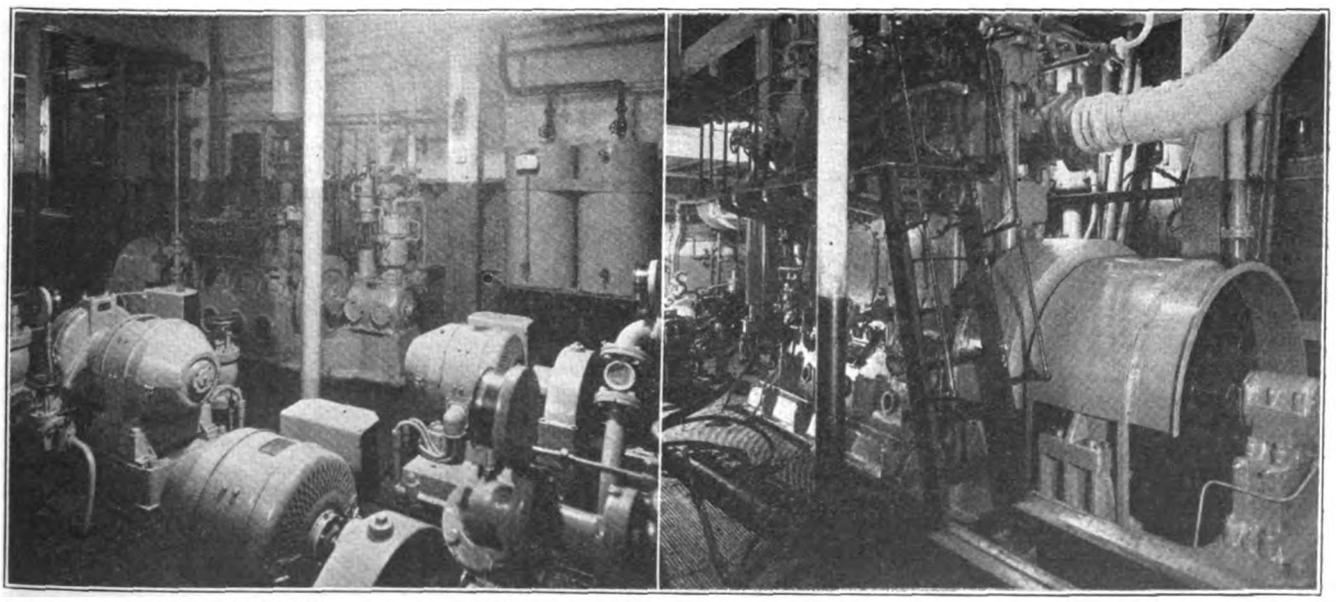


ENGINE ROOM M. S. SEMINOLE—PORT SIDE MAIN ENGINE—DOUBLE ACTING

**TABLE IV**

**Seminole Conversion Costs**

| | |
|---|---|
| Installation and alterations | $436,260 |
| Main engine, including spares | 242,207 |
| Deck machinery, including steering gear, motors, control and cable | 29,320 |
| Engine room auxiliaries including engines, generators, pumps, coolers, switchboard, cable | 95,000 |
| Equipment and outfit | 25,000 |
| Engineering, purchasing, inspection, traveling, freight extras, trial trip and incidentals | 38,000 |
| Total | $865,787 |



ENGINE ROOM M. S. SEMINOLE—AT LEFT—STARBOARD SIDE—PUMPS AND SMALLER AUXILIARY GENERATING SET—AT RIGHT —LOOKING AFT AT STARBOAD 75 K. W. DIESEL GENERATING SET—ONE OF THREE



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## Main Engine and Auxiliaries on M. S. Seminole

**TABLE V**

**Main Engines**

Make: Hooven, Owens, Rentschler Co.
Type: Double acting; two-cycle; air injection.
Diameter of working cylinders: 27.55 inches.
Stroke: 47.24 inches.
No. of cylinders: 4.
Brake horsepower: 3680.
Revolutions per minute: 115.
Piston speed: 905 feet per minute.
Fuel nozzles: 1 top; 2 bottom.
2 air starting tanks: capacity 550 cubic feet each.
Working pressure: 400 pounds. (maximum)
Cooling: Jackets—salt water, and pistons—fresh water.
Maxim silencer.

**Auxiliary Engines**

3, Make: Worthington Pump and Machinery Corporation.
Type: Single acting; two-cycle; air injection.
Diameter of working cylinders: 12½ inches.
Stroke: 13¼ inches.
No. of cylinders: 3.
Brake horsepower: 115.
Generators: 75-kilowatts—240 volts, Ridgway.
Cooling: Jackets—salt water, pistons—oil.
Revolutions per minute: 265.
Piston speed: 585 feet per minute.
Excess air capacity: 170 cubic feet each.
Maxim silencer.

**Emergency Lighting & Compressor Set**

Make: Mianus Diesel Engine Co.
Type: Single acting; two-cycle; solid injection.
Diameter of working cylinders: 5 5/16 inches.
Stroke: 7⅛ inches.
No. of cylinders: 3.
Brake horsepower: 22.
Revolutions per minute: 550.
Piston speed: 653 feet per minute.
Cooling: Salt water.
Generator: 14-kilowatt Diehl.
Rix compressor.
Maxim silencer.

**Pumps, Water**

Make: Nash Engineering Co.
Salt water cooling: One 750 gallons per minute, self-priming, centrifugal—motor, General Electric, 30-horsepower.
General service: One 750 gallons per minute, self-priming, centrifugal—motor General Electric, 30-horsepower.
Fire: One 200 gallons per minute, centrifugal—motor General Electric, 20-horsepower.
Engine room bilge: One 300 gallons per minute, self-priming, centrifugal—motor General Electric, 7½-horsepower.
Fresh water: (portable) One 70 gallons per minute, centrifugal—motor General Electric, 7½-horsepower.
Sanitary: One 70 gallons per minute, centrifugal—motor General Electric, 7½-horsepower.
Fresh Water: (piston cooling) Two 200 gallons per minute, self-priming, centrifugal—motor General Electric, 7½-horsepower.

**Pumps, Oil**

Make: Kinney Manufacturing Co.
Lubricating Oil: Two rotary plunger, 150 gallons per minute—motor General Electric, 7½-horsepower.
Fuel oil transfer: One rotary plunger, 250 gallons per minute—motor General Electric, 20-horsepower.

**Boiler**

Vertical type, working pressure 110-pound gage—173 square feet healthy surface.
Oil burner: Sunbeam centrifugal atomizer.

**Ice Machine**

York, 2-ton ammonia direct expansion type, direct driven Diehl motor, 235 revolutions per minute.

**Propeller**

Four-bladed built up type.
Diameter: 16 feet, 3 inches, pitch 12 feet, 0 inches.

**Steering Control**

Speery telemotor—Westinghouse control panel—automatic, hand with automatic followup, hand nonfollowup.

**Winchs**

10 cargo—1 warping—Lidgerwood Mfg. Co., self-oiling, special design—electric driven, Westinghouse motor and control—quick make and break type controller.
Winches fitted with Cutler-Hammer shoe brakes.

**Windlass**

Rebuilt for motor drive. Westinghouse 45-horsepower motor and control panel—Cutler-Hammer shoe brake.

**Fire Extinguishing System**

Walter Kidde, $CO_2$. Lux system, eighty 50-pound cylinders for $CO_2$, twenty hand $CO_2$ containers, four 2½-gallon hand acid type, fire main (water).

**Radio**

1-kilowatt spark and 2-kilowatt arc.

**Galley**

Range: New York French Range Co., oil fired, fitted with Ray Burner.
Coffee urn and water boiler: Electric—Automatic Electric Heater Co., radiant type, specially designed—4 kilowatts
Capacities: Coffee, 5 gallons, water, 14 gallons.
Hot water heaters: Main—Automatic Electric Heater Co., 4.5 kilowatts—100 gallons. Crew—Automatic Electric Heater Co., 1.5 kilowatts—15 gallons.

**Whistle**

Sperry—Visible type.

**Searchlight**

Sperry—Incandescent, 1000 watts.

**Oil Separators**

Manufactured by De Laval Separator Co.; two for fuel oil, 300 gallons per hour of pressure type, one for lubricating oil, 150 gallons per hour of open type.

number there were the regular crew operators and several representatives of the shipping board engaged in making tests. Notwithstanding all this number of men it was easy at all times to get about, and the shipshape arrangement and condition of equipment was the subject of much comment.

Like the other vessels, the SEMINOLE was completely stripped before starting the work of installing the new power plant. The arrangement of machinery was carefully designed to fit the individual character of the SEMINOLE'S equipment, which in some respects differs from the previous vessels.

From the 30-day continuous test of the main engine at the plant at Hamilton, O., the positions of the throttle and the corresponding brake horsepower were known and this helped in determining actual performance of the engine at sea.

All of the auxiliaries below and above decks are electrically driven. The details of this equipment are shown in accompanying tables. The original windlass, built integrally with a small steam engine, was rebuilt, in place, for electric motor drive. To do this the bracket and bed plates supporting the steam engine were merely cut off with a gas torch and a new bed plate containing a 25-horsepower Westinghouse motor was bolted on. The steering gear is operated from the bridge by a special gyro pilot and dual electric steering system developed by the Sperry Gyroscope Co. The method of steering may be quickly changed from hand operation to automatic or vice versa. The cargo winches are all new and of the special design worked out by the Lidgerwood Mfg. Co., in co-operation with shipping board engineers.

Before installing the new machinery the SEMINOLE was drydocked, scaled, chipped and painted. The hull is of modern design built on the Isherwood system of framing.

The trial trip, although held under the direction of the shipping board, represented by Chairman T. V. O'Connor, Commissioner P. S. Teller, Captain R. D. Gatewood and others, was actually carried on by the ship's regular force of commissioned officers, headed by Herbert Hudson, captain.

### Done In New York Yard

An accompanying illustration gives a general view of the Tietjen & Lang plant of the Todd Shipyards Corp. where the SEMINOLE was converted to diesel power. This is the first New York shipyard to secure one of the conversion contracts. It did so in the case of the SEMINOLE on the low bid installation and alterations of $436,260.

Following her trials the SEMINOLE proceeded to pier 4, army base, Brooklyn, where she at once started loading cargo for Australia. The vessel has been allocated to the Roosevelt line for the Australian, Far East and India service. She is now classed with the finest American freighters afloat.

The officers of the SEMINOLE are: Captain, Herbert Hudson; chief engineer, T. M. McComb; first officer, C. V. Kane; second officer, P. H. Erickson; third officer, J. M. Albrecht; steward, A. F. Tarte; first engineer, A. L. Foster; second engineer, F. Roberts; third engineer, W. F. Wylie; fourth engineer, A. C. Cartwright; electrician, W. Stanton.

Thus remains of the original 12 vessels in the board's first conversion program only two which have not had sea trials, the WEST GRAMA and the WILLSCOX. The WEST GRAMA'S trial was scheduled originally for mid-November and it is at the time of this writing, to be held Dec. 2. The WILLSCOX'S engine of double acting M. A. N. type built by New London Ship and Engine Co., completed its 30-day shop test successfully July 17, and is being installed.



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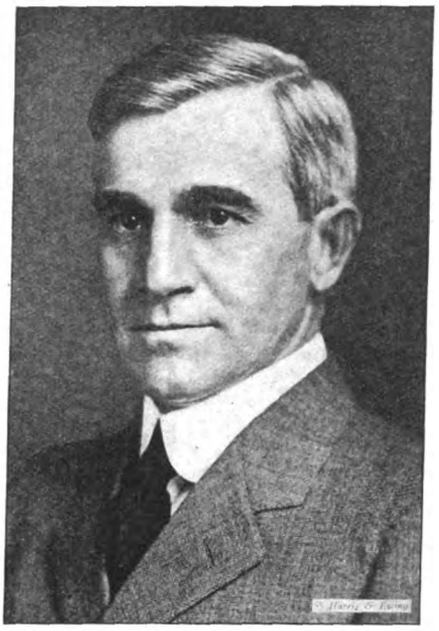
# *Build Ships or Give Up the Sea Say American Naval Architects*

**Emphasize Lack of Replacements—Annual Meeting at New York—Best in Attendance and Enthusiasm—Society Shows Vigorous Growth**

DAVID W. TAYLOR
*Retiring President of the Society*



HOMER L. FERGUSON
*Newly Elected President*

IF THE fact that the thirty-fifth general meeting of the Society of Naval Architects and Marine Engineers held at the Engineering Societies building, 29 West Thirty-ninth street, New York city, on Nov. 10 and 11 was one of the best attended and most enthusiastic meetings ever held, has any signifiance there is still hope for a proper American merchant marine. Never before under normal conditions have so many keenly interested members taken part in the presentation and discussion of papers during the two days of professional sessions. After the reading of one paper President Taylor found it difficult to check discussion in order to give a brief interval for lunch. The annual banquet of the society which was held according to custom in the ballroom of the Waldorf-Astoria hotel was attended, it was said, by nearly 600, and late applicants for seats at the banquet were turned away. It can not help but be significant that in spite of present deplorable conditions in the industry that it is possible to get together so vigorous and wide awake a group. It is proof of what has often been said that America's heritage of the natural rights to a merchant marine, bounded as she is by the two great oceans of the world, can not be denied no matter how inept for the time being may be the policies of our government, nor how lacking in interest may be the great rich stretches of our interior.

The general meeting was called to order by Rear Admiral D. W. Taylor, U. S. N. retired, president of the society. Announcements were made covering the report of the secretary-treasurer and the election of council members and president for the coming year. Admiral Taylor having served the three years allotted by custom, Homer L. Ferguson, president of the Newport News Shipbuilding & Dry Dock Co., was nominated and unanimously elected president. An exceptionally large number of members, associates and juniors were approved and enrolled with the society.

In his presidential address Admiral Taylor again pointed out for the third successive year the unsatisfactory condition prevailing in the shipbuilding industry and that this, of course, was due to the poor status of our merchant marine. The only hopeful occurrence for the shipbuilder he said has been the letting of a few naval contracts with some others in sight. He then touched upon the fact that the multiplicity of remedies suggested for our sick merchant marine actually hinders improvement.

Admiral Taylor's address deserves the closest study by all who have the interests of the merchant marine at heart. He is the pre-eminent American in the originality and practical importance of his researches in the field of naval architecture. He served the country throughout the war period and afterwards as chief constructor of the navy. He is respected abroad and his views are always conceded serious consideration. His presidential address before the society is therefore published in full as follows:

For the third successive year it is my painful duty to remark upon the unsatisfactory situation of the shipbuilding industry of the United States, a situation which is of course incident to and a result of the un-



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satisfactory situation of our merchant marine.

Fortunately during the past year there have been some naval contracts and there is a good prospect for more, but as regards new merchant work it is still a case of hope deferred.

Without burdening you with statistics the merchant marine situation may be pictured in a few words.

While as to total tonnage we are second only to Great Britain in one respect we are first and the rest of the nations including Great Britain are nowhere. We are pre-eminent and lead the world in idle, unused, laid up, and out-of-date tonnage.

When we consider building it is another story. At the beginning of October we were seventh in tonnage building. The six countries ahead of us in the order of amounts of tonnage building were Great Britain, Germany, Italy, Holland, France and Denmark. Sweden and Russia were each only about 10 per cent behind us.

Looking at the matter in another way, of completed world tonnage, if we include our idle and unusued tonnage, the United States owns something like 20 per cent—not an unsuitable figure considering the magnitude of our commerce. But of the new tonnage being built in October the world over only 3 per cent was under construction in the United States.

### Pacific and Atlantic Shipyards

The story of this percentage is fully confirmed by the concrete situation of our shipyards. On the Pacific coast before the World war there were building yards on Puget sound, San Francisco bay, and in Southern California. I am referring to prewar conditions, not to the intense effort inaugurated in the war, not counting the cost to meet the Macedonian cry from abroad for ships, more ships, and still more ships. Today on the Pacific coast not only have the mushroom wartime plants vanished, but the prewar yards with minor exceptions are as regards building closed or in a state of suspended animation.

On the Atlantic the yards as a whole are going steadily down hill though they are not quite so near the bottom of the hill as on the Pacific.

The year just past has seen the final chapter of dismantling of the yard in Maine that for more than twenty years led in designing and building our naval destroyers. Nowhere were better destroyers built than at Bath.

Upon the Delaware a yard where ships had been built for ninety-seven years completed three passenger vessels unsurpassed in their class in design, material and workmanship, and closed its doors.

Only upon the Great Lakes and our inland waters have the building yards held their own during the past year.

### Overseas Commerce Under

As regards overseas commerce, the figure of 51 per cent fixed in the congressional declaration of policy of 1920 as the least proportion that should be carried under the American flag has never been reached, and we are now handling about 30 per cent of our overseas commerce under our own flag. However, this percentage taken alone is liable to give a wrong idea of the condition of our overseas carrying trade. It includes, for instance, the operations of tankers owned and operated by oil companies as an incident of their major business.

If we consider carrying trade proper, excluding vessels owned and operated by large companies mainly in connection with their own products, the American flag percentage would be well below 30.

Perhaps you think I have now reached a point where there should be given a formula or prescription that would remedy the situation. That would be easy but I am not going to do it. One great reason why matters have reached their present pass is that there are so many methods of remedying them—all perfectly sound as a remedy.

Considering three broad divisions only—each has in it any number of possible variations—it is obviously possible—mechanically under suitable financial arrangements, that this country could have a merchant marine doing 51 per cent of its carrying trade under government ownership and operation, under government ownership and private operation, or under private ownership and operation.

The trouble is that hardly any two of the very large number of doctors that have been and will be consulted agree fully as to the relative cost and desirability of the many possible prescriptions that will cure the patient who for lack of *some* prescription grows steadily worse.

Of course there are doctors that do not think that the patient should be cured. There are plenty of foreign doctors who are prescribing in the case though not ostentatiously.

The foreign doctors and some few of our own claim that the world including the United States would be happier and better off if we abandoned the idea of an overseas merchant marine and let the patient die; that we could rely upon foreign flag ships to do our carrying trade better and more cheaply than we can do it under the American flag.

Without venturing into the fields of diplomacy and international relations it is to be hoped that happenings in those fields during the past year have brought home to our people the fact—and it is a fact—that any nation—every nation—considers its own interests first—also—last and all the time. Once wholly dependent upon foreign flags for our carrying trade the inevitable corollary is that we would pay through the nose.

However, the nation-wide investigations completed by the shipping board last winter made it quite plain that a vast majority of our citizens wish a merchant marine under he United States flag. They wish the patient to be cured.

Let us hope that the doctors during the coming session of congress—a very critical one for the merchant marine—may produce a prescription that will at least start the patient on the road to health.

### Relative High American Costs

Let me remind you at this point that of the complication of diseases with which the patient is afflicted the one which interests us most professionally is the excess cost of building ships in this country as compared with foreign costs. This is of course due mainly to the fact that wages enter so lightly into the cost of shipbuilding and our wage scales are above those of other shipbuilding nations. Here again the doctors differ as to the amount of the excess cost. The exact amount, however, is not the thing of importance. With capital charges—interest, depreciation, insurance, etc.—25 to 30 per cent of the cost of operation of a permanent merchant marine we are under a crushing handicap whether our first costs are 40, 50 or 60 per cent above the foreigner. I earnestly trust that when the merchant marine prescription is compounded it will take care of this question of excess first cost, directly and definitely.

With any roundabout scheme there will be less pressure upon the profession to reduce first cost and only by constant pressure in this direction and constant practice in building can we expect our excess cost to be lowered even if not wiped out.

Of course there are doctors who would give up our shipyards and



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have a foreign built merchant marine under the United States flag. They would not kill the patient but only cut off a leg and arm.

I hardly think the prescription when and if it comes will involve government expenditures to build merchant ships abroad or aid in operation under the American flag of foreign-built ships.

### Technical Developments of Year

Technical developments in our field during the past year have shown a progress that is steady but not startling. Pulverized coal has shown sufficient promise on tests ashore to warrant the shipping board giving it a service trial afloat, which is now underway.

Its advocates are confident that with its aid steam will make head against the internal combustion engine. Meanwhile, the latter still makes progress and is being installed on more than half of the world tonnage now building.

As we devote the whole of our meeting tomorrow to pulverized coal and internal combustion papers, I will say no more on those subjects except to call attention to the remarkable advance during the year in the application of one type of internal combustion motor. I refer to the air-cooled airplane motor. This has been the develpment of several years but during the past year whether flying over the Atlantic and Pacific, carrying the mails in private hands, or in the army and navy, this type of motor has come into its own.

May I remind our engineers dealing with internal combustion engines for marine purposes that the air-cooled airplane motor of today weighs about 1½ pounds and costs about 20 dollars only per horsepower.

This weight and cost are recognized as too high and will probably be reduced next year.

### Future Professional Progress

In concluding my last presidential address I am going to preach a bit—very briefly—to our younger members, taking for my text, as it were, an actual occurrence of some forty years ago. At that time a young man taking one of the few college courses in electrical engineering then existing insisted upon leaving at the end of three years of a four-year course upon the ground that the electrical business had reached its ultimate and was being so overdone that it was necessary for him to secure a position in good time rather than complete his course.

Now I don't believe that idea originated with any young man. It was impressed upon him by his elders. We elders sometimes find it hard to realize that progress in our profession as in others will never cease. One of the peculiar difficulties of our profession insures in a way that progress will continue.

A ship probably makes use in its construction of more of the sciences, arts and trades than any other structure of man. The larger the field the more room for progress.

While our young members will see progress continue in the future, I think they will see it more closely associated than in the past with research—both as to fundamental principals and the myrid details whose sum is becoming more and more important as a factor in the product—the completed ship.

Trial and error were the main dependence of the generation now gone. They have served the present generation well in spite of the steady advance of science and research but for the next generation science and research should reduce trial and error to a minimum.

### Subjects Needing Research

The historical paper on the WAMPANOAG we are to hear reminded me of an advance by error.

When the WAMPANOAG was built several other steamers of the general class were built with various types of experimental machinery. The machinery of several failed dismally and one of them—finally named the IDAHO—had her machinery removed, was converted into a pure sailing vessel and sent to Japan as a store ship.

On the voyage she proved herself by far the fastest sailer in the navy before or since.

Such an unexpected result would hardly be unexpected today since model basin research would compare the ship in the design stage with other models of completed ships.

But even in this branch which has been developed for fifty years our tools for research need further improvement.

Existing model basins cannot deal satisfactorily with cavitation and for thirty odd years since Barnaby first identified and named the phenomenon of cavitation it has been a reproach to the science of naval architecture and marine engineering that no research has been made clearing up the many points still obscure in this connection.

One more illustration of a need for research and I am done. When we consider that the frictional resistance of nearly all types of ships is more than 50 per cent and in some cases as great as 90 per cent of the total it is evident that if this could be materially reduced every ship that floats would be better off.

Of course a manufacturer of ship bottom coatings is usually prepared to demonstrate that his product reduces friction.

Such research as I know of in this connection indicates that the differences are infinitesimal but do we know that science has said its last word on this subject?

Here is a field for research that has been barren so far but some day may richly repay cultivation.

### Technical Papers Presented

Fourteen papers were presented in the two days' professional sessions of the society. The titles and the names of authors of these papers and brief abstracts are given below:

1. *"Carfloat Strength and Deflection,"* by Prof. Evers Burtner, member, and Richard Tingey, visitor.

In this paper the authors give a brief description of car floats and their service, strength requirements and types of construction. Deflection and strength measurements and calculations of theoretical stress and deflection are considered. Also launching tests were studied to determine the stress and deflection during this operation. Investigation was also made with a load test. The stress amidship and the deflection due to placing known loads on each end of float were measured and calculated. The effect of deflection due to temperature was studied in several tests on steel hulls and a formula was derived for predicting the approximate deflection due to temperature changes.

2. *"The Design of Superstructures for Large Passenger Ships,"* by Carl E. Petersen, member, and Lorentz Hansen, visitor.

In this paper an important and little studied feature of ship design has been subjected to careful analysis, both from a theoretical and practical point of view. The authors have reviewed previous and published literature in connection with this subject adding to it and elaborating on it by the results of their own investigations. A number of plates illustrating the text matter form part of this paper.

3. *"The Wampanoag, the Fastest Ship in the World*—1868," by James Swan, member.

This is a most interesting paper. It represents a great deal of labor in the way of historical research into the records of the early navy concerning this unique vessel in which the propeller revolved at approximately twice the rate of speed of the engines, a gear drive being used. Interesting figures of the trial of this wonderful ship are given in which the mean speed is noted at 16.75 knots. She was credited with having logged as high as 17¾ knots several times during her trial. Model experiments cast some doubt on the accuracy of this figure. Carefully prepared records of early marine engineering feats are rare



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and the society is indebted to the author for his contribution of this interesting paper.

4. *"The Submarine of Today,"* by *Lawrence Y. Spear,* member.

This paper summarizes the development of the submarine during and subsequent to the War. A number of tables are given comparing types of different nations, also various alternative characteristics of modern submarines. Illustrations are given of a number of different types of submarines.

5. *"Model Tests with Adjustable Blade Propellers,"* by Capt. William McEntee, council member.

The author comes to the following general conclusions from tests made at the United States experimental model basin, Washington; (*a*) That if an adjustment in pitch after the vessel is in service is anticipated the design pitch of the propeller should be on the low side so that the blade will have to be turned up rather than down. (*b*) That for moderate changes in pitch the resulting efficiency and revolution can be closely approximated by assuming the propeller to have a constant pitch equal to that at two-thirds the radius.

6. *"Tank Steamer Fires and Explosions,"* by Robert L. Hague, member.

This paper will be published in full in thus issue or in a subsequent issue of MARINE REVIEW.

7. *"What Is Naval Aviation Doing,"* by E. S. Land, C. C., U. S. N., member.

Naval aviation is "playing the game." This paper completely illustrated, summarizes the valuable work which has been done by the navy to advance aviation. During the last fiscal year naval aviation has developed splendid types of planes which are now in production. Experimental units are in service. The author states that if a national emergency were declared today naval aviation would be in a position to place its orders immediately for the types best suited to the service. These types are already in production. This does not mean that the ultimate is reached at any time nor that naval aviation is satisfied with all types. It is, however, in a position of knowing what it wants in time of emergency, it has its plans and specifications ready and the industry is ready to produce on a moment's notice.

8. *"Test of Pulverized Coal as Applied to Scotch Marine Boilers,"* by Carl E. Jefferson, member, and Commander Joseph S. Evans, U. S. N., visitor.

The keenest interest was displayed in this paper, particularly so in view of the fact that while it was being read the S. S. MERCER, first large ocean going vessel to be fitted to burn pulverized coal, was demonstrating at her pier at Hoboken, N. J., the entire practicability of doing so This paper is devoted to an account of tests which have been carried out by the fuel conservation committee of the Merchant Fleet Corp. in conjunction with the staff of the fuel testing station at the Philadelphia navy yard. The test covered here was on a typical scotch marine boiler. After many preliminary trials a 240-hour continuous test was carried out beginning July 27, 1927, and terminating Aug. 6, 1927. During this test for 48-hour periods following each other without interruption, combustion rates of 1200, 1400, 1600, 1800 and 2000 pounds per hour were maintained. The burners were supplied by the Peabody Engineering Corp. and the mill of ball type by Kennedy-Van Saun Mfg. & Engineering Corp. Mr. Jefferson and Commander Evans were in charge.

The article is fully illustrated both with photographs and drawings. The results of the test are given completely. The boiler efficiency is plotted for the different rates of combustion. A mean curve indicates a maximum efficiency of 75 per cent at the 1400-pound coal rate. The minimum efficiency was about 71 per cent at the 2000 pound per hour coal rate. A maximum efficiency of slightly over 80 per cent was obtained during one of the watches at the 1400-pound per hour coal rate. It is impossible to over-state the interest which the splendid results of the work of the fuel conservation committee has created as embodied in this paper. Practically everyone feels that it is possibly the first really important step in a new era of fuel combustion, meaning a return to coal where and when that product is cheaper than oil and where it is more easily obtainable. On the Great Lakes for instance where very little oil is fired under boilers and where coal is universally used this sort of an installation would be of the greatest importance in greatly increasing efficiency and in eliminating the burning of grates and the extremely hard labor in firing. The authors were given the thanks of the society for their valuable and inspiring paper.

9, *"Pulverized Coal Tests of a Marine Water Tube Boiler,"* by Thomas B. Stillman, member.

This paper was also received with great interest. It is evident that the tests which it records were conducted with the greatest care in the most careful and scientific manner by engineers of the Babcock & Wilcox Co. at its Bayonne, N. J. plant. The paper describes these tests and the results to date. Some general statements are also given concerning the advantages and disadvantages of this method of firing coal as observed during these tests. The paper carefully covers the various physical characteristics of the equipment. The results of the various tests are given completely. It is stated from experience with the tests that consistently higher boiler efficiencies may be secured with pulverized coal properly handled under a boiler than with any other method of firing this fuel.

On plate eight curves are given showing the comparative efficiency of oil fuel, pulverized coal and hand fired coal for watertube boilers. For instance at six pounds of water evaporated from and at 212 degrees Fahr. per square foot of heating surface per hour, the efficiencies are as follows: For hand fired coal, 73.2 per cent; for pulverized coal, 78.8 per cent; and for oil fuel, 82.8 per cent. The author in presenting this paper to the society summarizing the results obtained in pulverized coal tests on a marine water tube boiler has contributed information of great value to the industry. It is of course necessary to establish the feasibility of burning pulverized coal under water tube as well as under scotch boilers and this the author has done in his paper.

10. *"Test of Two-Cycle Double Acting Marine Diesel Engine,"* by Ernest Nibbs and Stephen A. Gardner, members.

This paper is a completely and carefully illustrated and prepared article covering the thirty days' continuous test of the New London Ship & Engine Co.'s 3680 brake horsepower, double acting M.A.N. type of diesel engine which that company furnished the shipping board for installation in the 9500 deadweight ton freighter, WILLSCOX.

11. *"Diesel Engines for the Navy,"* by Edward C. Magdeburger, visitor.

The author discusses the application of diesel engines to different classes of war vessels. Examples are given of the rapid strides made in Germany in the application of diesel power. The author states that if the World War had continued the Germans would have installed 12,000 brake horsepower oil engines on the wing screws of their new cruisers in order to greatly increase their cruising radius. Two such engines were actually completed and had successful shop trails. These engines were subsequently ordered destroyed by the allied commission. There is building today in Germany an 11,000-ton battleship equipped with diesel engines. The recently constructed cruiser KONIGSBERG is said to have diesel engines for cruising in addition to her 65,000 shaft horsepower steam turbine installation.

12. *"The Engines of the United States Shipping Board Diesel Conversion Program,"* by Capt. R. D. Gatewood, C. C. U. S. N., member.

The author who has been responsible to the United States shipping board for the program for converting to diesel drive a number of steam freighters tells in this paper something concerning all of the different types of engines installed and gives certain general data on the initial service of the vessels delivered. There is also appended log sheets covering the 30-day tests on each of these engines.

13. *"Modern Trend of the Diesel Engine with Respect to Low Rate per Horsepower, High Revolutions per Minute and High Mean Effective Pressure,"* by O. D. Treiber, member.

The author in his paper discusses the practicability and the engineering features in the design and construction of diesel engines of high speed and light weight per horsepower. The main interest of the paper centers around the author's own design and present construction of two 3000 horsepower light high speed diesel engines. In these engines of 600 to 700 revolutions per minute the weight is only 20 pounds per brake horsepower. Many interesting drawings and diagrams are published with this paper.

14. *"Vibration and Engine Balance in Diesel Ships,"* by Prof. Frank M. Lewis, member.

Professor Lewis has discussed in his paper those special problems of

(*Continued on Page* 50)



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## Shipping Board Awards Contracts for Fuel Oil

Contracts for supplying fuel oil for shipping board steamers operating from Atlantic and Gulf ports, for the calendar year 1928, have been made as follows:

Gulf Refining Co.: For delivery at New York for bunkering ships, estimated maximum requirements of 315,000 barrels per month at a maximum price of $1.63 at terminals and $1.68½ by barge; for bunkering at Philadelphia, estimated maximum requirements of 66,000 barrels per month at a maximum price of $1.53 at terminals and $1.58½ by barge; for bunkering at Galveston, Texas, estimated maximum requirements of 262,500 barrels per month at a maximum price of $1.33 at terminal and $1.38½ by barge; for bunkering at Port Arthur, estimated maximum requirements of 40,000 barrels per month at a maximum price of $1.28 at terminals and $1.33½ by barge.

Under the terms of this contract the New York price will be the posted market price at New York; the Philadelphia price will be 10 cents below the posted price at New York; the Galveston price will be 30 cents below the New York price, and the Port Arthur price will be 35 cents below the New York price.

Standard Oil Co. of New Jersey: For bunkering at New Orleans, estimated maximum requirements of 175,000 barrels per month at a maximum price of $1.30 at terminals and $1.35 by barge; and for delivery to shipping board tankers at Bay Town and Baton Rouge, La., an estimated total of 1,300,000 barrels for the year at a flat rate of $1.15 per barrel.

The Texas Co.: For bunkering at Charleston, an estimated total requirement of 25,000 barrels per month at a maximum price of $1.55; and for bunkering at Jacksonville, an estimated total requirement of 15,000 barrels per month, at a maximum price of $1.55 per barrel. These maximum prices shall be the posted market price on day of delivery, subject to maximum quoted. Same applies to the contract of the Standard Oil Company of New Jersey.

Contracts for supplying the fuel oil requirements of shipping board vessels operating in the Pacific during the 12-month period beginning Nov. 7, 1927, were awarded the Richfield Oil Co. of Los Angeles, on Nov. 1.

The major item is for 2,750,000 barrels of oil to be delivered to shipping board tankers at the seller's terminal at San Pedro. The price for this amount is 78½ cents per barrel. The amount includes oil for bunkering tankers loading at the terminal.

A second item is 750,000 barrels for bunkering shipping board vessels at the San Pedro terminal. In cases where it is possible for vessels to receive the oil at the terminal, the price is 78½ cents per barrel, and in cases where it is necessary to bring the oil by barge to ship side the price is 83 cents per barrel. All other bids were rejected.

## James Swan Appointed Marine Superintendent

When Warren T. Berry, for many years superintendent of marine construction of the New England Steamship Co., died recently, the management of this well known Long Island sound line chose James Swan, editor

JAMES SWAN

of *Marine Engineering & Shipping Age*, to fill the vacancy. He eminently has the training, experience and traditional background to ably fill this post.

He was born in Boston and graduated from the Massachusetts Institute of Techology in 1891 after which he remained at that institution for several years as an instructor in naval architecture. He then studied naval architecture at the University of Glasgow under Professor Biles, and was for a brief period connected with the professor in his private practice as a naval architect.

After his return to the United States, Mr. Swan began a long period of intensive practical experience in naval and merchant ship construction. During this time he was chief of hull scientific department of the Newsport News Shipbuilding & Dry Dock Co., where he was associated with the design of the Pacific Mail liners KOREA and SIBERIA. Leaving Newport News he went to the newly organized New York Shipbuilding Co., Camden, N. J., and remained there in various capacities for about 17 years, the last five of which as assistant to the president. This work brought him into contact with the late De Courcy May and the late Samuel M. Knox. The greater part of the time from 1909 to 1914 was spent in representing the New York Shipbuilding Co. in Great Britain, Turkey, China, Russia, Uruguay, Argentine, Peru and Chili.

From the New York Shipbuilding Co. in 1917 Mr. Swan went to the Herreshoff Mfg. Co., the famous yacht building yard at Bristol, R. I., where he remained until 1921, when he became president of the Groton Iron Works, Groton, Conn. From 1922-1923, Mr. Swan was engaged on special survey and appraisal work including that for the 900 laid up shipping board vessels. It was in the fall of 1923 that Mr. Swan took up his editorial work.

He has a very wide acquaintanceship among shipbuilding and shipping men and his broad experience, fine technical education and all around equipment will assure him, we believe, that success in his new work which his many friends will wish him.

## Large Ferry Ordered

The Great Lakes Engineering Works has received an order for the construction of the largest steel hull automobile and passenger ferry steamer on the inland waters of America. This ferry is to be built for the Detroit & Windsor Ferry Co. and will operate between Detroit and Windsor, Ont. The announcement of placing the order was made by Capt. Fred J. Simpson, vice president and general manager of the ferry company.

The new ferry was designed by Frank E. Kirby. It is expected that she will be ready for service in April of next year.

This vessel has been designed for winter service and will have a large passenger cabin on the promenade deck. There will be accommodations for 75 automobiles which increases the automobile carrying capacity of the company's ferry fleet to 900 each hour.

The new ferry will be 157 feet long by 56 feet beam and 17½ feet deep.



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# *Electrify Shipboard Auxiliaries for More Economical Operation*

By A. O. Loomis

USING sea water for circulation through coolers, condensers, etc., adjustable speed service is needed for reasons already given. With the use of the compound wound motor, adjustment of the speed is obtained:

1. By moving the shunt field rheostat hand wheel.
2. By depressing the "fast" or "slow" push button, and obtaining the motor speed corresponding to the rheostat setting.
3. By depressing a "fast" or "slow" button, and obtaining response from a motor operated starting and field regulating rheostat, to give any value of speed within the range of the rheostat.

The first method indicated above is the least expensive, and generally is quite satisfactory, the applications being extended usually to the smaller pumps. For the larger sizes which include the condenser circulating pumps, cargo oil pumps, etc., operators appreciate the convenience of "fast" and "slow" buttons to give the desired speed adjustment.

The second method includes the adjustment of the rheostat at the panel, and in addition, the use of push buttons (at locations convenient to the operator) for short-circuiting the rheostat for slow speed, and introducing the proper amount of resistance in the shunt field when the "fast" button is depressed, thereby relieving the short circuit across the rheostat. A field fluttering relay is used with this scheme to effect satisfactory acceleration of the motor.

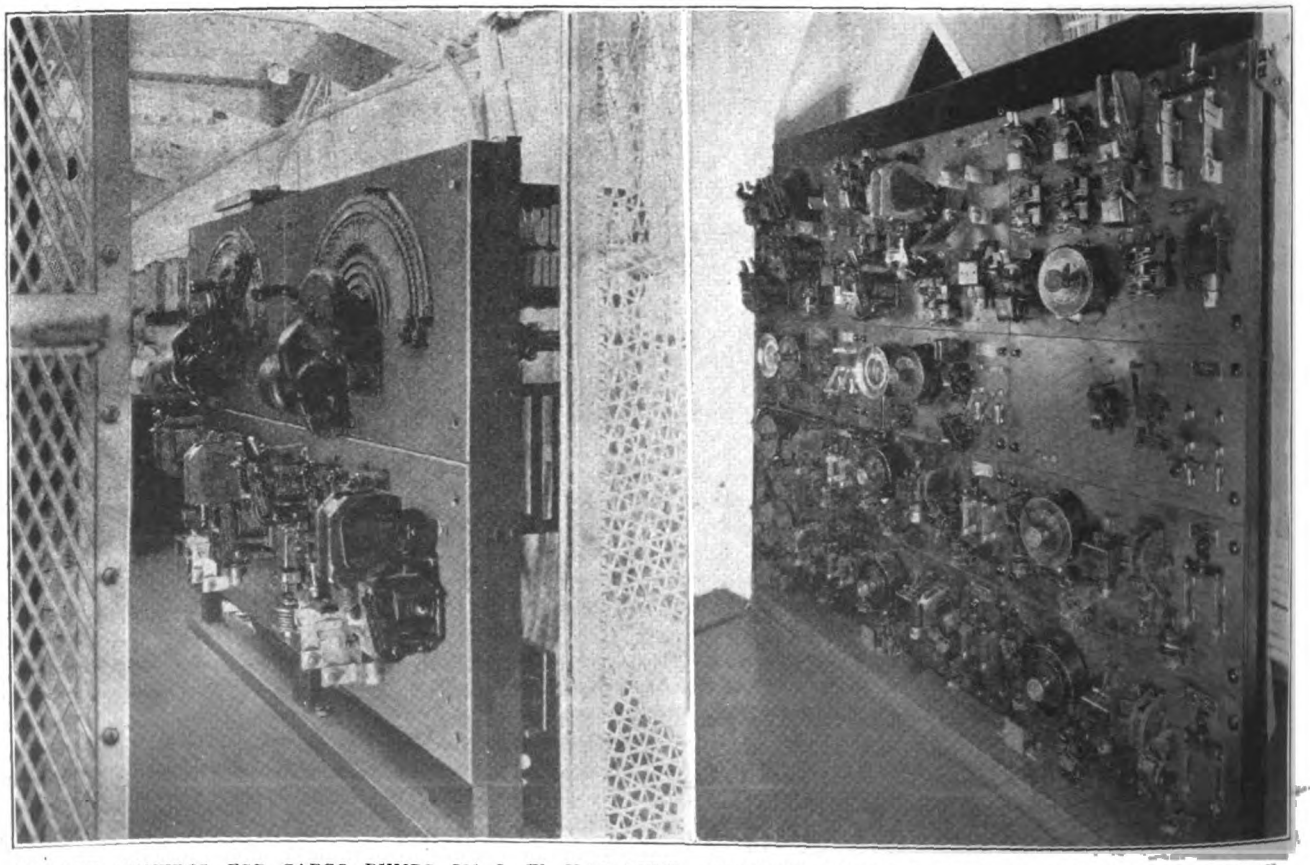
### Methods of Speed Adjustment

The use of the motor-operated starting and field regulating rheostat, set forth in method 3, is most convenient in that any speed of the motor within its range can be obtained by depressing either the "fast" or "slow" button for sufficient time to accomplish the desired result. An adjustable "stop" for any maximum speed setting is provided to give such maximum speed regardless of the extent of the travel of the arm. In case of injury to any part of the motor drive mechanism, manual operation is possible by depressing and moving the rheostat handle in the normal manner.

The use of a meter operated from a magneto driven from the pump shaft and indicating the approximate rate of flow of the liquid being pumped represents "short cut" operating practice in connection with adjustable speed equipments, especially those for the handling of oil in bulk under fairly constant head. The meter indications, calibrated in barrels per hour, furnish, for each particular system, approximate records to those responsible for pumping the oil.

On account of the centralized grouping of machinery in the engine room and the possibility of locating one or two centralized group control units adjacent to the power and lighting switchboard, or any

This article is continued from page 59 of the November issue of MARINE REVIEW.



AT LEFT—CONTROL FOR CARGO PUMPS ON J. W. VAN DYKE. AT RIGHT—MOTOR CONTROL SWITCHBOARD—EAST INDIAN



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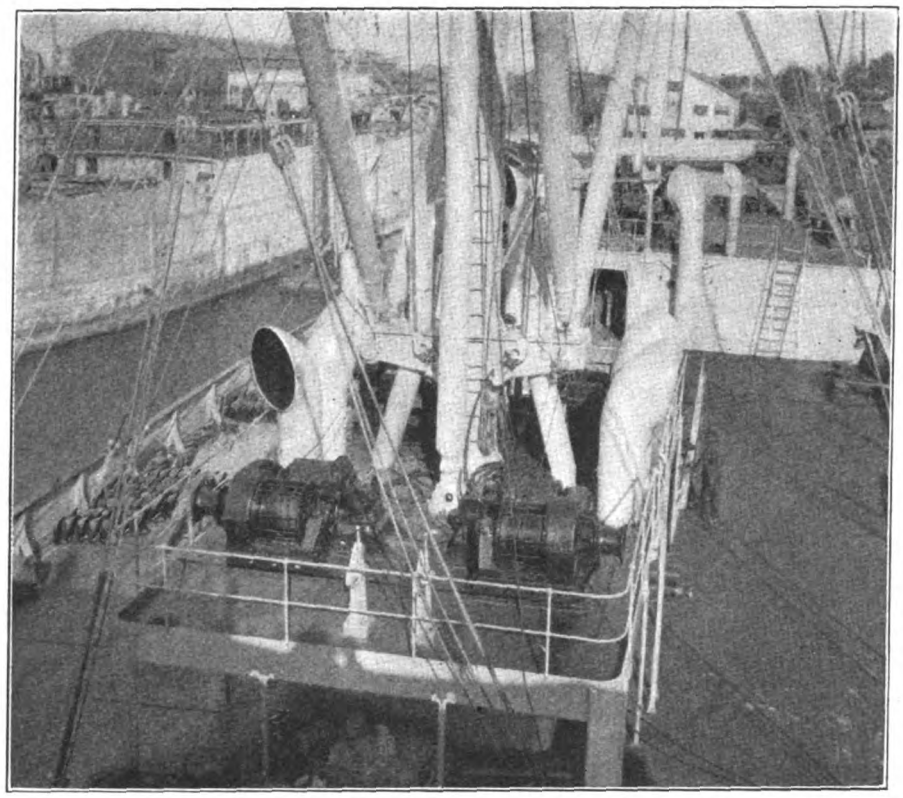
other suitable position of advantage to the operators, the desirability of preparing engine room layouts with the auxiliary controllers grouped in the switchboard type of units is quite obvious. Control panels designed for group mounting are economical of space, since the question of cabinet enclosure is not involved as in the case where individual controllers are set up throughout the engine room. The advantage of having many controllers grouped where repairs can be made in clean and dry surroundings, are apparent. The renewal of fuses, although a comparatively easy matter, becomes a very simple problem when the renewals can be made almost without taking the operator's attention from the main switchboard, certainly without taking him from the operating platform.



ELECTRIC DRIVEN WINCHES ON RAISED PLATFORMS, M. S. TAMPA—CONTROLS HOUSED BELOW

The resistors for most of the engine room motors, being of a class for starting duty only, can be mounted in the rear of the control panels where adequate ventilation is possible, and repairs or changes in wiring can be made with comparative ease.

The advantages obtained by the use of magnetic starters are enhanced when the equipments are grouped in one location where the engineer in charge can supervise to the best possible advantage the operation of the auxiliaries. For this purpose, the installation of push buttons at the control panels, in addition to those at the motors, is recommended.

Ventilating systems on shipboard are grouped to great advantage under the plan of centralized control. The location of the control station near the electrician's or junior engineer's quarters, is convenient. Unlike the engine room equipment, the operation of the ventilating fans cannot be observed from the control station. Lamps to indicate which systems are running, are mounted on the control panel. The practice of providing centralized control for hull ventilation is more popular on foreign vessels than on our own.

### Electrical Deck Auxiliaries

Coming out on the exposed deck, one finds more rugged machinery than that below. Much has been written concerning this class of electrical equipment because of its difference from the usual types of shipboard apparatus.

On deck the electric cargo winches are the "money-makers" by reason of the savings which they effect in the cost of handling the cargo. Efforts are directed to speeding up the various operations so that the gangs of stevedores will not be idle, but will always have the benefit of the maximum possible efficiency of that type of drive which has never failed in its help to man.

Although the winch motors and brakes have in general the same form for different vessels, the control equipment is not nearly so uniform. Both cam-operated and magnetic controllers have been supplied to various vessels by the company with which the writer is connected and both watertight and non-watertight cam control has been used. Magnetic control panels are usually placed in a protected location and hence are non-watertight. Also, it is preferable that resistors and protective panels be mounted away from the direct action of the weather. Obviously all forms of control equipment will be benefited by protection from the ship's structure itself. The watertight cam controller with separately mounted resistors and protective panel fulfills the requirements of protecting most of the equipment. A smaller part of the equipment is exposed when magnetic type controllers are used with only the master switches on the open deck. Remotely operated, non-water-tight cam type controllers, located along with the protective panels and resistors in suitable deck houses, are popular on the "well" type of vessel such as those recently converted to diesel drive by the United States shipping board.

In case of cargo winches the controller sets up a different electrical circuit for lowering from that for hoisting. Control of the load during lowering is obtained by reason of the motor being overhauled (spur gear drive) and acting as a generator. Adjustments of the resistor values are made on the several points of the controller resulting in different lowering speeds suitable for efficient cargo handling.

Members of the marine profession demand of the electric winch when lowering, stable speeds on all notches of the controller. This means that on the last controller notch lowering the load will not "run away". Such is not the case with the steam winch for which the load can be made to "run away" with wide open throttle in the lowering direction. It is, therefore, evident that for this condition, the requirements imposed upon electrical equipment are more exacting than those which are regarded as safe for steam winches.

This is true also concerning the automatic setting and releasing of the solenoid brake attached to the motor shaft. For the purpose of stopping the equipment in an emergency, a push button station is used.



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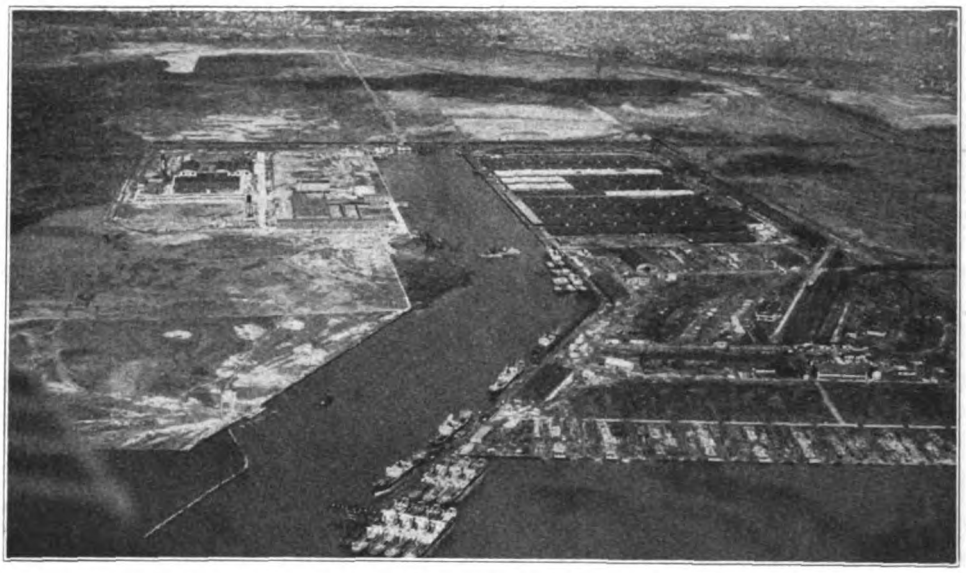
# Dock Management Progress Section

## How Successful Dock Operators Have Met Problems of Giving Best Service to Ships

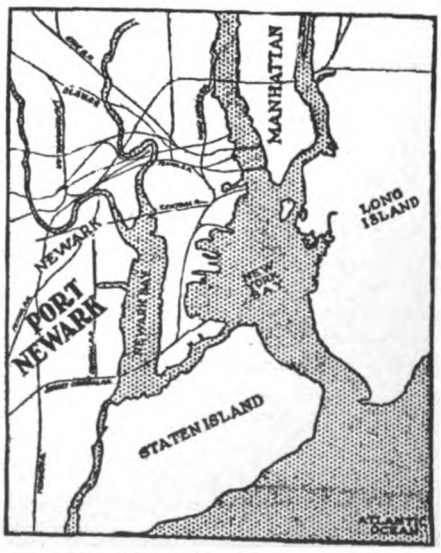


*Airplane View of Port Newark Development June, 1927—30 Feet Depth of Water*

# *Port Newark Attracts Shipping By Its Location and Equipment*

IT IS difficult to conceive of any port development in the United States which has more justification on sound economic grounds than Port Newark, N. J. Nor has any project of this nature been more intelligently and energetically carried forward. For years Thomas L. Raymond, commissioner of public works and now mayor of the City of Newark ably assisted by a loyal staff headed by J. W. Costello, chief engineer, has been the advocate, the sponsor and the man of action in the development of the port in the face of many difficulties and obstacles. With rare vision and courage based on a conviction of the possibilities of the project as an ocean port of consequence he has obtained from the city the necessary funds which, with a recently authorized appropriation of $2,500,000, now amount to a total of $12,000,000.

The map on this page shows the strategic location of Port Newark in relation to New York city which is only eight miles away; and yet it is as near the open Atlantic as the piers of New York harbor. A recent executive order by President Coolidge provides that Port Newark be considered within the customs district of the port of New York. Ships therefore may enter and clear at this port on the same basis and with exactly the same documents as required for arriving or departing at piers on Manhattan, Brooklyn, Staten Island or the Jersey shore of the Hudson. It is therefore in every sense an integral part of the great harbor system of New York. The approach to Port Newark from New York bay is through the Kill van Kull between Staten Island and the Jersey shore and into Newark Bay through a broad channel dredged to 30 feet at mean low tide with 31 feet throughout projected for the near future.




PORT NEWARK HAS READY ACCESS TO NEW YORK BAY

So much for its location as regards access to the sea and proximity to the greatest harbor in the United States. What of its location in relation to those elements which require the facilities of a great sea port and on which in the last analysis it must depend for the increasing trade that will mean its growth and prosperity? George S. Silzer former governor of New Jersey and now chairman of the New York Port Authority in an article defining the port



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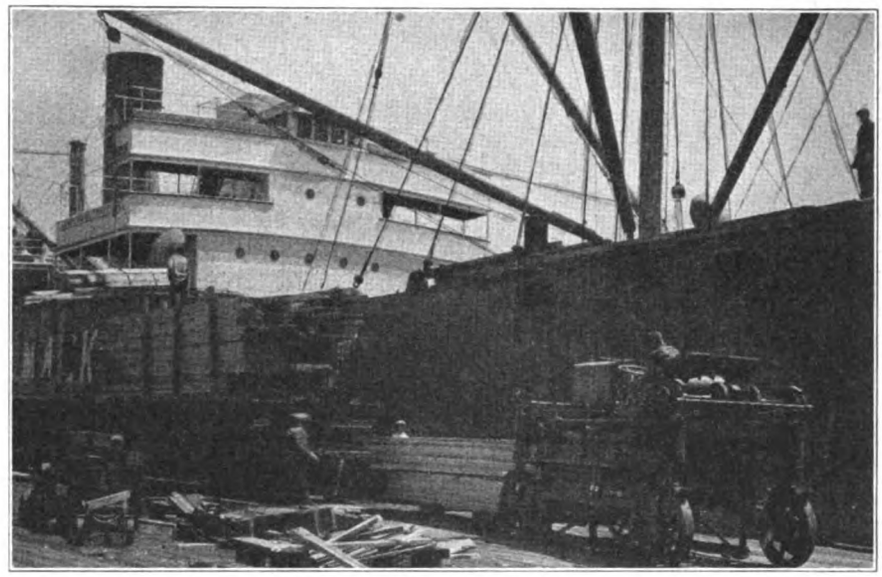
district over which that body has jurisdiction said, "Within its boundaries live close to 9,000,000 people or approximately one twelfth of the population of the country. Here is the country's greatest financial center. Here are located more manufacturing industries than in the four cities of Philadelphia, Chicago, Cleveland and St. Louis combined, and through this port there passes substantially one half of the foreign commerce of the country." Within a semicircle of a radius of 500 miles with Newark as the center live 42,837,000 people. To be a unit in the access to the sea of so vast a population and so rich a hinterland, constantly growing, provides tremendous possibilities for immense traffic as the exceptional advantages of the port in its location and physical equipment are more fully realized and become thoroughly known.



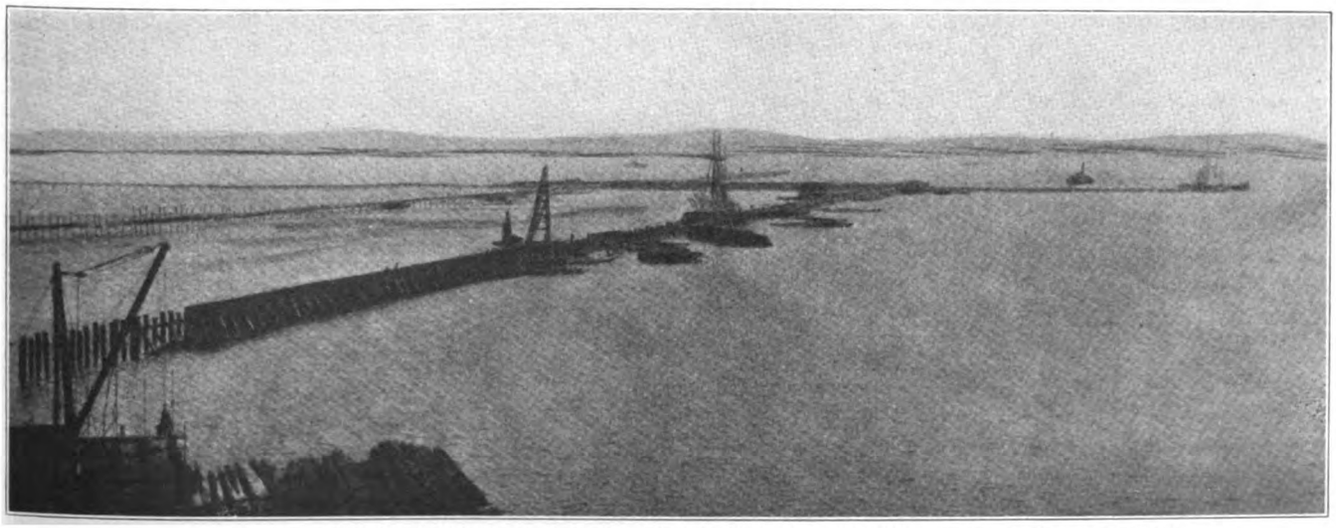
UNLOADING WEST COAST LUMBER FROM S. S. COMMERCIAL TRAVELER DIRECT TO RAILS AT PORT NEWARK

### How Development Came About

We now come to a brief history of the beginning of the development of Port Newark and some account of its present facilities and equipment. Twenty years ago the land along Newark bay was undeveloped meadow, practically waste land, assessed for purposes of taxation at $50 an acre. Frank J. Bock now postmaster of Newark and then director of the board of works of the city recognized the possibilities of developing Newark bay as a waterway and the reclamation of the bordering land for industrial purposes and as a terminal. Acting on this idea and obtaining the support of three other city officials he got a bill passed through the legislature of the state of New Jersey authorizing the city to spend up to $1,000,000 in acquiring land and developing an inland waterway. The bill carried the proviso for a referendum by the voters of the city of Newark and in the following election was duly approved. It was then attacked as unconstitutional but the courts ruled in favor of the bill. The board of works under the leadership of Mr. Bock then began to acquire the meadow lands along the bay. Borings to determine the nature of the substratum of the meadow area were taken and it was found that it was feasible to dredge and fill in the land with the excavated material. Before this program began there was about 4500 acres of land from which the city received in taxes about $4500. Now the lands privately owned return from $20 to $200 an acre. In 1926 the assessed valuation of meadow property exclusive of that owned by the city or government exceeded $10,000,000.

### Site Chosen for Shipyard

Not much progress was made until about 1914 when an effort began to carry out a plan. An accompanying illustration shows the condition at that time. Then the war came and port development commenced in earnest. Land which had been purchased by the city for $100 to $300 an acre was sold to the army for a base at $10,000 an acre. A gigantic quartermasters depot with docks and warehouses was built on this site by the war department at a cost of about $12,000,000. It was intended as a depot for shipment overseas of subsistence and forage. More than 2,000,000 tons were moved in and out of the base during 1919. As there was only a twenty foot channel at the time everything had to be lightered to New York. This involved an extra expense of at least $2,000,000 for rehandling and lighterage. The war department would not approve Commissioner Raymond's request for a 30-foot channel and eventually the city carried out this work at a cost of $600,000 so that today the largest freighters can use the



HOW PORT NEWARK LOOKED IN 1913 AT THE BEGINNING OF THE PRESENT DEVELOPMENT



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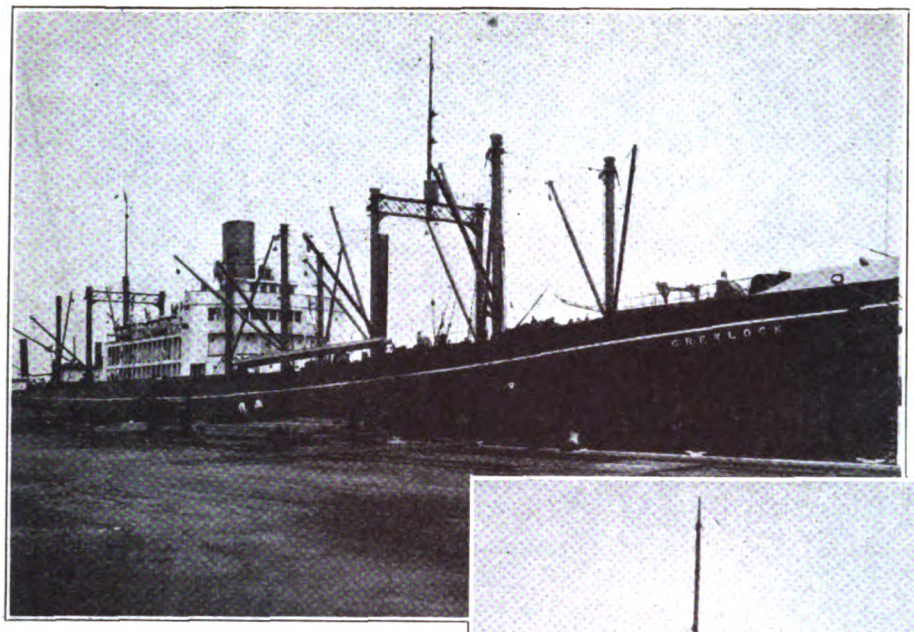
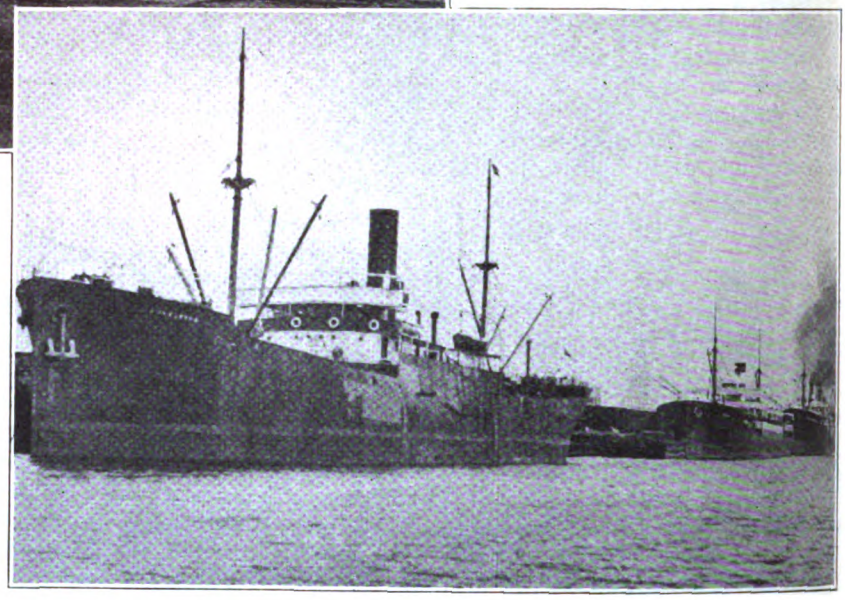


S. S. GREYLOCK OF THE ISTHMIAN STEAMSHIP LINES UNLOADING LUMBER AT CITY DOCK AT PORT NEWARK

port with perfect safety on all tides.

In 1917 when the need for ships became acute and the government accepted the proposal of the Submarine Boat Corp. to put up an erecting shipyard the company chose Port Newark and purchased a site of 132 acres. This property was highly developed for the purposes of shipbuilding. A railroad, with 26 miles of tracks fully equipped with rolling stock, locomotives and a classification yard connecting with the trunk lines, was laid down. An elaborate wet dock was built for outfitting the ships as they were launched. This dock is 4000 feet long and has three sets of railroad tracks and an overhead crane system with electric and steam cranes of 60 to 90 feet outreach. There was also installed a 70-ton gantry crane. Warehouses were built for about 50 per cent of the length of the dock. When the time came to turn from thoughts of war to peaceful persuits all of this equipment proved invaluable as a shipping terminal.

The army base at Port Newark suspended operation in 1922 and Mayor Raymond, then commissioner of public works, and his colleagues attempted to obtain this property by purchase from the war department at a reasonable figure but without success. It was then decided that the city should develop the south side of the channel opposite the army base. The inshore channel was increased in width from 400 to 685 feet. A marginal dock of 1000 feet in length was built, paved streets, sewers and other facilities for prospective tenants desiring waterfront industrial sites were provided. Dredging to widen the channel commenced in the fall of 1922. Work on the marginal dock started in March 1923 and was completed with the necessary fill in June 1924. About $1,000,000 was spent in the construction of this 1000-foot dock known as unit A; but its completion made available for leasing purposes 50 acres of waterfront property valued at $1,250,000.



FLEET OF VESSELS UNLOADING LUMBER, SUGAR AND GENERAL CARGO AT PORT NEWARK THROUGH THE SEABOARD AND TRANSMARINE TERMINALS

### City Builds Miles of Docks

In November 1925 another 1000-foot dock with streets, sewers and waterlines known as unit B was authorized. This project was completed in June 1926 and months before this the forty acres adjoining were leased to Sears-Roebuck Co. for a period of 50 years. A plant for the construction of ready-cut houses was erected on this site at a cost of nearly $2,000,000 by the lessee and now not less than 18 houses are being shipped each day. Work was started on a third 1000-foot dock in July 1926. This project known as unit C was completed in January 1927 and before its completion the 30-acre site adjoining was leased for a period of 20 years to the Weyerhaeuser Timber Co. This lessee is the largest wholesale lumber company in the United States. A fourth 1000-foot dock is now under way.

The building of 2000 feet additional docks on the inshore channel and five 1000-foot piers on Newark bay by 1930 will make a total of 4½ miles of docks constructed to that date by the city since 1917. Adequate rail service to these piers will be necessary and it is likely that a municipally operated inter-belt terminal will be created. The rail traffic to the port in 1926 increased 50 per cent over that for 1925 and amounted to 12.585 cars all loaded moving in and out of Port Newark. By 1930 it is expected that this movement will be doubled.

In addition to the two companies mentioned above as tenants on waterfront sites at Port Newark two other companies have large interests and are firmly established there, the Newark Seaboard terminal and the Transmarine Corp. and its subsidiaries the Atlantic Port railway and Newark Bay terminal. The army base property of 133 acres was leased for a period of 10 years from 1926 to the Mercur Corp. known as the Newark Seaboard terminal. Over $500,000 has been laid out by this company in improving the docks and warehouses along 1333 feet of waterfront. Contracts have been made with Cuban sugar brokers for the storage of 300,000,000 pounds of raw sugar. A transatlantic freight service out of Port Newark it is said will be started before the end of the year.



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The Transmarine Corp. has been connected with Port Newark longer and has done more to make its advantages as a seaport known than any other private interest. The reasons for this are apparent. After the remarkable shipbuilding feat accomplished on this site by the Submarine Boat Corp. that company was faced with one of the most difficult transitions from war to peace conditions imaginable. The corporation completed the last 32 ships of its contract with the government for its own account and in 1921 the Transmarine Corp. was organized to operate this fleet of freight ships out of Port Newark. With the Atlantic Port railway, an industrial steam carrier controlling 26 miles of tracks connecting with all the principal trunk lines, serving its steamships with freight consigned for water carriage, lighterage is eliminated and direct rail to ship movement is possible.

### Transmarine Lines' Service

A number of vessels of the fleet was placed in service from Port Newark to Havana, and in carrying coal and provisions for the Russian relief throughout the remainder of 1921 and the first half of 1922. In August 1922 a service was established to Pensacola, Fla. and in December of that year it was extended to include Port Arthur, Tex. A service from Port Newark to Los Angeles, San Francisco and Northwest coast ports was established in June 1923. In October 1923 a regular service was established to Mobile, Ala., New Orleans thence to Pacific coast ports and return to Port Newark. Following this in May 1924 a service was established to Beaumont, Tex., Mobile, Ala. and Pensacola, Fla. Activities of the company were again increased in May 1927 to include regular sailings between Port Newark and Houston, Tex. The company also operates a fleet of 30 steel canal barges of modern type each of 400 tons deadweight capacity, towed by diesel tugs, in a regular service between Port Newark or New York aand Buffalo through the New York state barge canal. These canal carriers deliver freight to any point in the New York harbor district or for trans-shipment.

Throughout the years that the Transmarine lines has been established at Port Newark its management has constantly emphasized whole-hearted co-operation and service to shippers. Its dock facilities and equipment for handling cargo were laid out on an elaborate scale as noted above for the outfitting of ships after launching. The dockage space of 4000 feet and warehouse and storage space comes under the Newark Bay Terminal Co. and the facilities under its control are open to the ships of all lines.

### Traffic at Port Growing

The economies in cargo handling by the elimination of lighterage and direct contact between rail and ship are becoming more and more recognized and the following steamship lines carry cargoes to Port Newark: American-Hawaiian; Arrow lines; California & Eastern; Dollar Steamship Co.; Isthmian; Luckenbach; Munson-McCormick; Munson; Ocean Transport; Panama Pacific; Quaker; Transmarine; and Williams.

During 1926 there was an increase of 61 vessels of about 200,000 tons over 1925. The value of the cargo tonnage was $44,000,000 or 33-1/3 per cent more than in 1925. Lumber to a total of 241,000,000 board feet an increase of 50 per cent over 1925 was brought in to Port Newark in 1926. In the month of September 1927, 50,000,000 feet of lumber was delivered by vessels at Port Newark. This is a new high record exceeding the best previous month in the history of the port by 15,000,000 feet.

A yearly statement of tonnage handled at Port Newark follows:

| Year | Tons |
|---|---|
| 1918 | 1,000,000 |
| 1919 | 2,000,000 |
| 1920 | 500,000 |
| 1921 | 200,000 |
| 1922 | 100,000 |
| 1923 | 300,000 |
| 1924 | 400,000 |
| 1925 | 570,000 |
| 1926 | 1,123,000 |

Though lumber is a very important item in the traffic at Port Newark there is an increasing amount of manufactured and raw products and general cargo. Of the tonnage during 1926 only about one-third represented lumber. The forecast for total tonnage handled at Port Newark for 1927 is at least 2,000,000.

In an article published in the *Sunday Call*, Newark, N. J. May 29, 1927, Raymond J. Dempsey, superintendent of Port Newark said in part:

"It has been consistently pointed out in all literature pertaining to Port Newark that great savings can be effected by the handling of commodities through this port—it is estimated that the saving to the consumer in moving cargo through Port Newark, as compared with Manhattan or Brooklyn, amounts to from two to ten days. On this basis the saving in interest charges to the consumer, based on ten days saving at 6 per cent of the valuation, equaled during the entire year 1926 on a volume of cargo of 730,000 tons not including lumber $75,000.

### Eliminates Cost of Lighterage

"Authorities say that the average cost of lighterage on Manhattan or Brooklyn to the railroads is $2.50 per ton. Total saving to the railroads during the year 1926 by avoiding lighterage on the foregoing volume of tonnage would have been $1,825,000.

"It is estimated that the average saving to a steamship operating at Port Newark, as compared with Manhattan or Brooklyn, is 50 cents per ton, on account of the quick dispatch given the ship at Port Newark. On this basis, the saving to the steamship owner equals 730,000 tons at 50 cents a ton or $365,000. In addition the trunk line railroads add a handling charge of 50 cents a ton, or the equivalent of 75 cents to $1 a thousand on all lumber discharged at Manhattan or Brooklyn for delivery to the railroads by lighter. This is a further argument for the economy of operation through Port Newark, where lighterage is entirely eliminated and lumber and other commodities are delivered and received direct to and from the railroads."

# Malolo Begins Service To Honolulu

THE MALOLO, largest and swiftest ship ever built in the United States, was placed in commission at New York on Oct. 25. Two days later she sailed from that port and, after touching at various ports en route, arrived at San Francisco on Nov. 12. She left the latter port Nov. 16 on her initial trip to Honolulu, which is to be her regular run.

This ship was designed by William Francis Gibbs and built by William Cramp & Son Ship & Engine Building Co. under the supervision of Mr. Gibbs. She is owned and operated by the Matson Navigation Co.

There are many notable features about the MALOLO, but none is more impressive than her stability. She is 583 feet long and has an 83-foot beam. She has 12 bulkheads, all extending up to F deck, or about 20 feet above the water line, and the water-tight bulkhead doors are operated hydraulically from the bridge. Any five compartments may be flooded, and, provided the engine compartment is not among them, the ship is able to reach port under her own power.

(*Continued on Page* 54)



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# What the British Are Doing

## Short Surveys of Important Activities in Maritime Centers of Island Empire

THE shipbuilding tonnage under construction during the September quarter was the highest since September, 1922. The total was 1,536,416 tons, an increase of 146,028 tons on the June quarter and of 761,619 tons on the figures for the previous September. The Clyde is now fairly active and there is a marked increase in the proportion of motor ships in course of building.

* * *

THE Orient line has placed an order for a mail and passenger steamer for their Australian mail service with Vickers Ltd., the builders of the ORAMA, OTRANTO and ORFORD. The new steamer will be larger than her predecessors, her tonnage about 22,000 and speed 20 knots.

* * *

SWAN, HUNTER & WIGHAM RICHARDSON, Wallsend on Tyne, has booked an important contract for six more Canadian Lake steamers and is also reported to have obtained an order for a cargo vessel for North country owners. The vessels will be built at the firm's Walker yard and the builders will supply machinery for the Lake steamers.

* * *

THE triple-screw steamer LAURENTIC has been handed over by Harland & Wolff after undergoing successful trials in Belfast Lough. The LAURENTIC has been built for the White Star line's Canadian service, but before taking up her regular sailings to Canada, she will be engaged on some of the popular winter cruises from New York. The vessel is one of the cabin class, being designed to carry 1600 passengers and she is of 18,724 tons gross. The vessel is propelled by three screws, each wing shaft being operated by a four-cylinder, triple-expansion reciprocating engine which exhausts to a low pressure turbine, direct coupled to the center line of shafting. The low pressure turbine in turn exhausts to two condensers of the regenerative type. The reciprocating engines and the turbine parts are specially balanced to eliminate vibration. Steam is supplied by four double-ended and four single ended boilers burning coal under natural draft, and the steam is superheated before delivery to the engines.

* * *

A & J. INGLIS LTD., Pointhouse, has launched the light-draft twin screw passenger vessel IGUAZU, built to the order of the Argentine Navigation Co. (Nicolas Mihanovich) Ltd., Buenos Aires, for service on the Alto Parana, Argentina. The vessel which is 135 feet in length, 34 feet in breadth, 15 feet 9 inches in depth to saloon deck, and of about 600 tons gross, will have semi-diesel internal combustion engines of the Gardner type.

* * *

ANOTHER of the new steamers ordered by Cardiff ship owners has been launched by Hawthorne, Leslie & Co., Hebburn on Tyne. This is the LLANBERIS of 8250 tons deadweight, built to the order of Thomas Radcliffe & Co. The steamer is 400 feet x 53 feet 6 inches x 28 feet molded depth, and built of steel, is of the single deck type and built to Lloyd's highest class.

* * *

THE CALEDON SHIPBUILDING & ENGINEERING CO. Ltd., Dundee, has obtained orders for four steamers. Three, which are for London owners, will each be of 9000 tons. The fourth, ordered by James Currie & Co. Ltd., Leith, will be smaller, and will be employed in the Continental trade. James Currie & Co. have also contracted with Ramage & Ferguson Ltd., Leith, to build a 1200 tons deadweight steamer for the Leith and Copenhagen trade.

* * *

A FURTHER bid on the part of that section of the marine engineering world which favors the employment of steam, as opposed to diesel engines, has been made in the design of the engines of the Ellerman line's CITY OF ROUBAIX launched from Swan, Hunter & Wigham Richardson's yard. This vessel will be propelled by single reduction three-stage Parsons turbines, fed by steam at a pressure of 300 pounds per square inch, all her auxiliaries being electrically driven and it is expected that very economical results will be obtained. She is one of three vessels, the other two being quadruple expansion and diesel engined, respectively, which are being built for the Far East, and Australian trades maintained by the Bucknall Branch of the Ellerman lines.

# What's Doing Around The Lakes

SHIPMENTS of steel and pig iron on the Great Lakes made an appreciable gain during the 1927 season, which characterized the tendency of iron and steel producers to reach out more widely for markets. Estimates are that between 25,000 and 30,000 tons of pig iron were shipped into the Chicago district from Cleveland and Buffalo furnaces during the season. This tonnage includes a number of mixed cargoes of steel and pig iron coming from Buffalo. Steel shipments alone far exceeded each of the past several years. Structural sections shipped from eastern mills comprised a large portion of the 1927 movement. Chicago district mills slightly increased their shipments to Montreal and other Canadian points during the season. Shipments to Montreal averaged about one cargo every two weeks for the greater part of the navigation season. Improved facilities for unloading pig iron at South Chicago have been developed.

* * *

GREAT Lakes combination passenger and freight services went



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on winter schedules directly after the Thanksgiving holiday. General merchandise shipments became lighter in the early part of November, due in part, it is believed, to the abnormal warm autumn weather. Several of the transportation companies took boats out of service with the drop in merchandise shipments. The Goodrich Transit Co., Chicago, removed from service two of its side wheelers.

* * *

FRUIT shipments on the Great Lakes from the Michigan fruit belt were fairly satisfactory to lake transportation companies during the season. These shipments fell short of 1926 activity, which was heavier than usual. The 1927 fruit movement also was considerably abbreviated, and failed to extend into the early winter months as was the case a year ago.

* * *

GREAT Lakes transportation companies are adding new motor truck lines as feeders for merchandise shipments. A number have been added during the past year. The Goodrich Transit Co. has a night motor truck service for its lines, running between Kalamazoo and Benton Harbor, Mich.

THE new receiving station opened by the Goodrich Transit Co. in the central manufacturing district, Chicago, has met with a popular need in the southwestern section of Chicago. According to reports, shippers are finding this station a source of convenience.

* * *

LAKE shipments of stone and iron ore to the Gary, Ind., harbor ended Nov. 15 with the arrival of a cargo of stone from Calcite, Mich. Shipments of both stone and ore were continued later in the season to eastern ports.

# Ocean Freight Rates

**Per 100 Pounds Unless Otherwise Stated**

**Quotations Corrected to Nov. 18, 1927 on Future Loadings**

**NOTE: FREIGHT RATES STEADY WITH SLIGHT CHANGE**

| New York to | Grain | Provisions | Cotton (H. D.) | Flour | General cargo cu. ft. | General cargo 100 lbs. | ††Finished steel | REMARKS Freight Offered |
|---|---|---|---|---|---|---|---|---|
| Liverpool | 2s 3d‡ | $0.60 | $0.40 | 0.20 | $0.50 | $0.90 | $8.00T*** | Fair |
| London | 2s 6d‡ | 0.60 | 0.40 | 0.20 | 0.50 | 0.90 | 8.00T*** | Fair |
| Oslo | $0.20 | 0.45 | 0.50 | 0.30 | 0.50 | 1.00 | 8 00T | Fair |
| Copenhagen | 0.20 | 0 45 | 0.50 | 0.30 | 0.50 | 1.00 | 8.00T | Fair |
| Hamburg | 0.15 | 0.55 | 0 40 | 0.25 | 0.50 | 0.90 | 10.00T | Fair |
| Bremen | 0.16 | 0.35 | 0.50 to 65 | 0.25 | 0.50 | 0.90 | 10.00T | Good |
| Rotterdam and Amsterdam | 0.17 | 0.32½ | 0 40 | 0.25 | 0.45 | 0.80 | 9.50T | Fair |
| Antwerp | 0.14 | 0.32½ | 0.40 | 0 20 | 0.45 | 0.80 | 9.50T | Fair |
| Havre | 0.14 | 0.55 | 0.50 | 0.30 | 0.45 | 0.80 | 9.00T | Quiet |
| Bordeaux | 0.14 | 0.55 | 0.50 | 0.30 | 0.45 | 0.80 | 9.00T | Quiet |
| Barcelona | .... | 0.50 | 0.30 | 10.00 bags | —12.00T— | | 10.00T | Fair |
| Lisbon | .... | 0.75 | 0.50 | 8.00T bags | —23.00T— | | 8.00T | Good |
| Marseilles | .... | 0.65 | 0.40 | 7.00 bags | —23.00T— | | 8.00T | Good |
| Genoa | 0.18 | 14.25 | 0.50 | 9.00 | —23.00T— | | 11.50T | Fair |
| Naples | 0.18 | 14.25 | 0.50 | 9.00 | —23.00T— | | 11 50T | Fair |
| Constantinople | 0.27 | 20.00T | 0.85 | 0.40½ | —24.00T— | | 11.50T | Fair |
| Alexandria | .... | 20.00T | 0.85 | 0.40½ | —24.00T— | | 11.50T | Fair |
| Algiers | .... | 0 85 | 0.60 | 0.45 | —23.00T— | | 11.50T | Good |
| Dakar | .... | 17.00 | .... | 15.50T | —23.00T— | | 11.50T | Good |
| Capetown | .... | 18.00 | .... | 13.00 | 20.00 | | 13.00 to 18.00 | Good |
| Buenos Aires | .... | 22 00T | .... | .... | 20.00 to 22.00T† | | 8.00 to 8.80T | Fair |
| **Rio de Janeiro | .... | 22.00T | .... | .... | 20.00 to 22.00T† | | 7.00 to 7.70T† | Fair |
| Pernambuco | .... | 22.00T | .... | 9.00T | —22.00T—† | | 9.70T† | Fair |
| Havana | 0.35* | 0.50 | .... | 0.30* | 0.61 | 1.33 | 10.00 | Fair |
| Vera Cruz | 0.25 | 0.30 | 0.35 | 0.25 | 0.52½ | 1.05 | 0.30 to 0.35 | Fair |
| Valparaiso | .... | 1.07 | .... | 0.70 | .... | .... | 10 00T | Fair |
| San Francisco | .... | 0.35 to 0.70 | .... | 0.40 to 1.10 | | .... | 0.25 to 0-30 | Fair |
| Sydney | .... | 18.00T | 1.25 | 18.00T | 18.00-24.00T | | 9.00 to 12.—T | Very good |
| Calcutta | .... | .... | .... | 10.00T | —16.00T— | | 10 00T | Fair |

T—Ton. ‡Per quarter of 480 lbs. †Landed. ††Heavy products limited in length. *Extra charge for wharfage. **Plus $0.50 surcharge on all rates to Rio de Janeiro on account of congestion. ***Plus 15 per cent.

| From North Pacific Ports to | Lumber Per m. t. |
|---|---|
| San Francisco | $4.25 to 4.50 |
| South California | 4.50 |
| Hawaiian Islands | 9.00 to 10.00 |
| New Zealand | 15.00 to 18.00 |
| Sydney | 11.00 to 14.00 |
| Melbourne-Adelaide | 13.00 to 14.00 |
| California Ports | 3.75 to 4.50 |
| Oriental Ports (logs) | 15.00 to 16.00 |
| Peru-Chile | 11.75 to 14.00 |
| South Africa | 20.00 to 22.00 |
| Cuba | 16.00 to 17.00 |
| United Kingdom | 70s to 90s |
| United Kingdom (ties) | .... |
| Baltimore-Boston range | $12.00 to 14.00 |
| Florida Range | No rates |
| Buenos Aires | 10.00 to 15.00 |
| North of Hatteras | |
| China | 9.00 to 10.50 |
| Japan | 8.00 to 9.00 |
| Japan (logs) | 12.00 to 14.00 |

| Flour and Wheat | |
|---|---|
| U. K. and Continent (gross ton) | 31s 6d to 35s 0d |
| Oriental Ports (net tons) | $3.75 to 4.00 |

NOTE: Lighterage rates on fuel in New York reduced from 6½ to 5½c per barrel. The coal strike in Britain is now settled and freight rates or bunker prices for coal or pig iron are again quoted.

General cargo rates to Havana change daily and are omitted for the time being.

Rates to Calcutta are subject to change without notice. Cotton goes only to Bombay. Landing charge of $2.00 per freight ton at Valparaiso.

## Principal Rates To and From United Kingdom

| | s | d |
|---|---|---|
| Grain, River Plate to United Kingdom | 21 | 6 |
| Coal, South Wales to Near East | 10 | 3 |
| Coal, United Kingdom to Buenos Aires | 13 | 0 |
| Manganese Ore, Poti to Philadelphia | $4.00 | |
| Pig iron, United Kingdom to New York or Philadelphia | 12 | 6 |
| Iron ore, Bilbao to Cardiff | 6 | 3 |
| Iron ore, Huelva to Phila. or Balto | 11 | 0 |

## Bunker Prices

### At New York

| | Coal alongside per ton | Fuel oil alongside per barrel | Diesel engine oil alongside per gallon |
|---|---|---|---|
| Jan. 19, 1927 | 5.90@6.15 | 1.81½ | 5 87c |
| Feb. 18 | 5.25@5.50 | 1.81½ | 5.95 |
| Mar. 18 | 5.25@5.50 | 1.81¼ | 5.95 |
| Apr. 19 | 5@5.50 | 1 75 | 5.71 |
| May 19 | 5.65 | 1.81½ | 5.63 |
| June 18 | 5.50 | 1 71½ | 5.39 |
| July 19 | 5 65 | 1 65 | 5 24 |
| Aug. 19 | 5.50 | 1.71½ | 5.15 |
| Sept. 20 | .... | 1 65 | 5.04 |
| Oct. 20 | 5 65 | 1.61 | 5.13 |
| Nov. 18, 1927 | 5.50@5 65 | 1 46½ | 5.15 |

### At Philadelphia

| | Coal trim. in bunk per ton | Fuel oil alongside per barrel | Diesel Eng. oil alongside per gallon |
|---|---|---|---|
| Jan. 19, 1927 | 6 20 | 1.95@1.95½ | 5 88@6.19c |
| Feb. 18 | 5.24@5.50 | 1 90@1.91 | 5.64@6.13 |
| Mar. 18 | 5.24@5.50 | 1.95@1.95½ | 5.38@5.88 |
| Apr. 19 | 5.15@5.65 | 1.81@1.86 | 5.38@5.64 |
| May 19 | 5.15@5.65 | 1.75½@1.76 | 5.14@5.38 |
| June 18 | 5.00@5.25 | 1.70 | 5.12@5.14 |
| July 19 | 5.00@5.25 | 1.65@1.70 | 5.10@5.12 |
| Aug. 19 | 5.25 | 1.70@1.71 | 5.12@5.14 |
| Sept. 20 | 5.25 | 1.62@1.65 | 5.12@5.13 |
| Oct. 20 | 5.65 | 1.56 | .... |
| Nov. 18, 1927 | 5.20@5.65 | 1.45@1.46 | 4.88@5.12 |

### Other Ports

| | |
|---|---|
| Boston, coal, per ton | .... |
| Boston, oil, f. a. s., per barrel | .... |
| Hampton Roads, coal, per ton, f.o.b., piers | $4.35 to 4.50 |
| Nov. 11 — Cardiff, coal, per ton | 13s 0d |
| London, coal, per ton | —s —d |
| Antwerp, coal, per ton | 20s 6d |
| Antwerp, Fuel oil, per ton | 80s0d |
| Antwerp, Diesel oil, per ton | 95s 0d |
| British ports, Fuel oil | 75s 0d |
| British ports, Diesel oil | 90s 0d |



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# Late Decisions in Maritime Law

## Legal Tips for Shipowners and Officers

**Specially Compiled for Marine Review**
**By Harry Bowne Skillman**
***Attorney at Law***

BEFORE a ship can be held liable for personal injuries to one on board, it must appear that there was a breach of some duty on its part which it owed to the injured person, and therefore necessarily that he was aboard the boat at the invitation of the owner, either express or implied, or some person acting for the owner and within the scope of his authority. But a trespasser or a mere licensee takes the premises as he finds them; he enters at his own risk. The owner owes no duty to him to keep the premises in any certain condition for his benefit, only that he shall not knowingly let him run into a place of danger or shall not wantonly or recklessly injure him.—SILVERADO, 14 F. (2d) 243.

* * *

A HARBOR master has no authority to order the removal of a vessel which grounds in a harbor and is there unloading, and tugs which removed her to sea and anchored her where she was damaged by the seas cannot justify by claiming that they acted under his direction, and are liable for the tort. The authority of the harbor master is fully performed, said the court in the case of JAMES F. NEWSOME, 14 F. (2d) 244, when he designates the position in the stream or at the dock as to best facilitate the discharge of cargo, and at the same time interfere as little as possible with other vessels in the vicinity.

* * *

LARGE barges, with dredging machinery and boilers put upon the hulls, having depth and stanchness to make it possible for them to be towed to sea, decked over with hatches, and carrying crews, are "vessels" and "seagoing barges"; hence, are not subject to local inspection and license ordinances. Engineers operating the dredging apparatus on such barges, are "seamen," subject to the admiralty and commerce clauses of the constitution and are not within city licensing ordinances.—City of Los Angeles v. United Dredging Co., 14 F. (2d) 364.

* * *

THE validity of a stipulation in a bill of lading that a claim for loss or damage must be presented within as short a time as three days after discharge of cargo, or other stipulated event or time, has been generally recognized. But it is equally well settled that such a provision is not binding unless it is reasonable, and that the question of its reasonableness may largely depend upon the object of the notice, the length of the voyage, the knowledge possessed by the parties, and other circumstances of the case. Mere knowledge by the carrier at the time of delivery that there is a shortage of cargo, it was decided in the case of NATAL, 14 F. (2d) 382, does not meet the requirement that a claim for short delivery should be pre-

* * *

IT IS true," said the court in the case of LAMBS, 14 F. (2d) 444, "that the rule as to excessive speed [in fog] * * * is not strictly applicable to ferryboats, for the reason that they are obliged, from public necessity, to navigate in fogs. They are, nevertheless, required to use that degree of caution which corresponds with the necessity of navigating in a dense fog, where other vessels are reasonably to be expected." The ferryboat involved was driven forward through a busy harbor, in a dense fog, at about 9 or 10 miles an hour. The court held this to be negligence.

* * *

IN A similar case, that of BREIFOND, F. (2d) 445, the court said: "When a vessel, by her own statement, has a visibility of only 75 to 100 feet, she has no business to be running through a harbor, and close to anchorage grounds containing numerous vessels, at the rate of 7 or 8 knots.

* * *

WHILE holding that a tug is responsible for failure of her tow to carry proper lights, the court, in the case of TRANSFER No. 8, 14 F. (2d) 448, also decided that failure to carry lights in her tow in the position required by the pilot rules did not render a tug liable for a collision by another vessel running into her tow, where the barges in her tow carried lights as visible as they would have been in the prescribed position.

* * *

A CHARTERER was held liable, the case of Waldie v. Henry Steers, Inc., 14 F. (2d) 477, for injury to scows which were anchored to a stake boat in an exposed place, where they were allowed to remain for more than 20 hours after commencement of a gale, which finally caused them to go adrift, when they could have been removed at any time to a safe harbor nearby.

* * *

IN THE case of Carroll v. Central Railroad Co. of New Jersey, 14 F. (2d) 529, it appeared that a child six years old was standing with her mother on a ferryboat at a place where passengers had a right to be and was injured through the negligence of an employe in swinging open the gates. The court held that the child was entitled to recover for the injury, rejecting a contention that there was contributory negligence, which could be imputed to the child, because her father was on the other side of the boat and not holding her hand, which was injured.

* * *

IN THE case of Angola Transfer Co. v. Texas & Pacific Ry. Co., 14 F. (2d) 484, the owner of a steamboat claimed damages for total loss of the vessel, caused by rubbing against a steel cap projection extending over the top of a pier supporting a railroad bridge. In deciding in favor of the steamboat owner, the court said: "Rubbing of bridge piers is not evidence of faulty navigation or of negligence. The cases cited, as well as the act of congress, recognize the disadvantage of water craft in negotiating the draw spans of bridges, and their paramount right of navigation * * *. The law not only recognizes the vessel's right to a clear, unobstructed passage, but to the necessary flanking bulkheads, with smooth surfaces, parallel with the current, against which it may be rubbed and safely guided through at the expense of the owner of the obstructing bridge. * * * Any obstructions in a draw are deemed a danger for which the owner is responsible, and, when they cause injury to a vessel float, constitute a maritime tort."

* * *

IN A suit for failure to deliver or wrongful delivery, a provision of the bill of lading limiting the amount recoverable for a short delivery is not applicable, and the measure of damages is the market price which the shipper would have to pay to replace the articles in the port of delivery at the time delivery should have been made, customs duties not considered, less landing charges and freight, if not paid.—CABO VILLANO, 14 F. (2d) 978.

* * *

WORDS "with customary dispatch," in a charter party requiring loading by charterer with customary dispatch in accordance with the rules of the port of loading, do not relate to average or usual conditions, but are to be read and understood in relation to the circumstances, ordinary and extraordinary, existing at the time the loading is to be done.—Taisho Kaiun Kabushiki Kaisha v. Gano Moore Co., 14 F. (2d) 985.



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## Large Airplane Carrier Delivered to Navy

The U. S. S. SARATOGA, one of the navy's two mammoth airplane carriers now under construction—the largest and fastest American naval vessels ever constructed—was taken over by the United States navy Nov. 16. Official commissioning took place on that day when Rear Admiral Latimer, commandant of the League Island navy yard, Philadelphia, received the vessel from its builders. The carrier will be completed in the Philadelphia navy yard, will undergo extensive trials covering some months and will probably go into service about the middle of 1928.

The SARATOGA is a 33,000-ton vessel, originally designed as a battle cruiser under the 1916 naval program, but completely redesigned and converted to an airplane carrier as a result of the limitation of arms conference in 1921. She will be capable of developing a speed of 33 knots. A sister ship, the LEXINGTON, is now under construction at the Fore River plant of the Bethlehem Shipbuilding Corp., Quincy, Mass.

The SARATOGA is 888 feet long. The flying deck extends over the length of the ship, with no obstruction except on one side where a massive combined funnel enclosure houses masts, uptakes, turrets and superstructure. The beam of the flying deck is 106 feet at its widest. She will carry more than 300 officers and men, and will have a complement of 83 planes including three squadrons of 18 fighting plans each, two squadrons of 16 bombers, a squadron of 12 observation planes and one squadron of three utility planes.

The vessel is propelled by electricity, using a turbine generating plant and complete propulsion equipment and auxiliaries supplied by the General Electric Co. Its power plant will have a maximum rating of 180,000 horsepower, and the propellers will be driven by eight 22,500-horsepower motors, two being connected to each propeller shaft. Steam for the turbines will be generated by 16 oil-fired boilers.

## To Launch Tanker

The oil tanker ROBERT W. STEWART under construction at the Lorain, O. yard of the American Ship Building Co. will be launched at noon, Dec. 3. This vessel is similar to the tanker RENOWN and will, when completed cost about $1,000,000. She is 400 feet in length, 52 feet in beam, 25 feet deep and has a capacity of 40,000 barrels of oil. Her service will be the carrying of petroleum products on the Great Lakes for the Standard Oil Co. of Indiana, the owner. Mrs. Robert W. Stewart will be the sponsor at the christening.

## Maine's Governor Speaks

In an address before the Boston chamber of commerce early in November, Governor Ralph O. Brewster said in part:

"In construction and operating costs American shipping today must accept a handicap of 10 per cent. There is absolutely no warrant to ask the patriotism of American shippers to make up that lack, either through direct patronage of American merchant lines at higher costs or through imposition of the burden upon the railroads of the United States. No combination of railroads can make two and two equal five. The law has long permitted railroads to engage in the carrying trade overseas but James J. Hill years ago demonstrated its impracticability and paid a handsome price for the lesson.

"There are not lacking powerful voices that seemingly do not desire government aid. They say, 'Repeal the La Follette bill.' Certain of its provisions may be prudently modified, but in its stamping of American shipping with an American character it is vital for the purpose for which alone the marine exists. Foreign personnel would be useless in time of war and largely worthless in time of peace in the extension of our trade in the lands beyond the seas.

"They say, 'Sell the shipping to private interests and let the government get out of the way. No American ships can survive in the foreign trade except by mail subventions or by indirect government aid in the price at which the boats are bought. Captain Dollar has made it abundantly clear that the lines cannot be replaced."

## Fast Lakes Passage

The S. S. LAKE GEORGE, one of the salt water ships of James Davidson, ship builder, Bay City, Mich., made the fastest run ever recorded from Duluth, Minn., to Montreal; passing through five lakes—Superior, Huron, St. Clair, Erie and Ontario—as well as the St. Lawrence river and about 50 locks, covering the entire distance in 7 days and 21 hours. She left Duluth loaded to full Welland canal draft with 65,200 bushels of grain at 11 a. m., Oct. 20, and arrived at Montreal 8 a. m., Oct. 28. This is a remarkably good run for her type.

## Keel for Sister Ship Laid at Newport News

Word was received Nov. 17 by the International Mercantile Marine Co. that the keel of its second ship for the Panama Pacific line, a companion to the CALIFORNIA, the largest steamship yet built in an American yard, has been laid on the same ways at Newport News from which the latter was launched Oct. 1.

Fabrication of frames and plates for the new vessel has been going on for some months, and construction of the hull is expected to progress rapidly. The vessel should be ready for launching in 13 months. It is probable that she will be named the VIRGINIA. She will be practically a counterpart of the CALIFORNIA, except of about 12 feet greater length, and will have the same form of propulsion, turbo-electric drive, with oil-fired boilers. Her twin driving motors, which are rated at 17,000 horsepower, are practically completed at the General Electric Co. Schenectady, N. Y.

The CALIFORNIA will be ready for delivery to her owner on Jan. 15, and is scheduled to sail from New York to the Pacific coast on her first voyage Jan. 28. It was stated Nov. 17 that all her first class passenger accommodation for this voyage already has been sold or is under option, and that bookings are heavy for the tourist class accommodation. She will carry 751 passengers.

The fireproof construction of excursion boats is urged by D. N. Hoover, supervising inspecting general of the United States steamboat inspection service in his annual report made public Nov. 26. "It is true," Mr. Hoover states, "that pumps, fire extinguishers and well disciplined crews are now provided on these boats but the fact is obvious that the best protection would be super-structures built of fire proof material."

In the annual report of the United States Commissioner of Navigation A. J. Tyrer, attention is called to the desirability of legislation on the load line of American vessels. With a fleet in the foreign trade of around 1300 vessels of a tonnage of 6,290,000 the United States is now the only maritime nation of importance which does not have a law on this subject. As it is now American ships loading in foreign ports are obliged to comply with the detailed requirements of these ports in the absence of similar regulations of our own.



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# Marine Business Statistics Condensed

## Record of Traffic at Principal American Ports for Past Year

### New York

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 485 | 2,105,864 | 531 | 2,221,372 |
| September | 498 | 2,153,701 | 565 | 2,428,200 |
| August | 522 | 2,179,068 | 551 | 2,287,367 |
| July | 478 | 1,910,229 | 553 | 2,253,495 |
| June | 498 | 2,093,540 | 566 | 2,334,128 |
| May | 525 | 2,167,154 | 539 | 2,179,208 |
| April | 487 | 2,048,786 | 565 | 2,353,404 |
| March | 460 | 1,936,478 | 515 | 2,074,694 |
| February | 408 | 1,679,912 | 468 | 1,962,865 |
| January, 1927 | 417 | 1,736,991 | 455 | 1,868,270 |

### Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 94 | 211,988 | 63 | 136,871 |
| September | 77 | 188,481 | 50 | 95,898 |
| August | 99 | 235,657 | 70 | 153,305 |
| July | 83 | 186,182 | 53 | 110,614 |
| June | 95 | 213,122 | 66 | 180,861 |
| May | 88 | 196,606 | 47 | 86,214 |
| April | 86 | 194,135 | 52 | 123,179 |
| March | 96 | 223,255 | 58 | 131,147 |
| February | 81 | 190,536 | 48 | 126,619 |
| January, 1927 | 79 | 208,354 | 59 | 167,258 |

### Boston

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| September, 1927 | 114 | 375,509 | 83 | 243,244 |
| August | 149 | 441,819 | 96 | 285,255 |
| July | 147 | 401,008 | 103 | 326,695 |
| June | 155 | 344,548 | 99 | 242,957 |
| May | 130 | 318,196 | 100 | 262,982 |
| April | 120 | 343,388 | 72 | 201,868 |
| March | 95 | 301,413 | 59 | 187,556 |
| February | 83 | 277,063 | 40 | 119,246 |
| January | 88 | 266,147 | 51 | 159,241 |
| December, 1926 | 97 | 286,013 | 52 | 170,314 |

### Portland, Me.

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 32 | 60,920 | 35 | 71,587 |
| September | 32 | 68,688 | 32 | 61,227 |
| August | 33 | 61,873 | 32 | 58,949 |
| July | 37 | 62,890 | 35 | 55,144 |
| June | 24 | 31,714 | 25 | 34,855 |
| May | 24 | 38,244 | 22 | 37,246 |
| April | 21 | 37,182 | 21 | 37,114 |
| March | 23 | 63,195 | 27 | 73,944 |
| February, 1927 | 23 | 65,826 | 21 | 59,178 |

### Providence

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 7 | 24,736 | 1 | 2,875 |
| September | 4 | 12,240 | 4 | 14,109 |
| August | 5 | 27,235 | 1 | 4,035 |
| July | 11 | 37,384 | 5 | 17,628 |
| June | 3 | 12,559 | 5 | 15,930 |
| May | 9 | 36,882 | 6 | 25,950 |
| April | 7 | 28,776 | 5 | 18,903 |
| March | 7 | 26,065 | 7 | 25,780 |
| February | 3 | 10,380 | 6 | 23,696 |
| January, 1927 | 3 | 9,632 | 6 | 20,091 |

### Portland, Oreg.

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 57 | 208,738 | 70 | 254,270 |
| September | 59 | 211,182 | 79 | 291,920 |
| August | 32 | 117,116 | 47 | 157,715 |
| July | 31 | 110,966 | 35 | 119,824 |
| June, | 24 | 91,554 | 33 | 118,631 |
| May | 24 | 86,618 | 28 | 98,277 |
| April | 31 | 120,431 | 44 | 159,247 |
| March | 21 | 78,379 | 31 | 106,768 |
| February | 15 | 63,320 | 28 | 106,855 |
| January, 1927 | 29 | 102,736 | 39 | 134,127 |

### Baltimore

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 118 | 365,876 | 116 | 350,509 |
| September | 116 | 355,924 | 130 | 402,528 |
| August | 131 | 390,713 | 138 | 408,083 |
| July | 128 | 384,450 | 130 | 368,096 |
| June, | 125 | 375,204 | 125 | 376,019 |
| May | 112 | 333,895 | 117 | 340,274 |
| April | 131 | 409,145 | 127 | 377,039 |
| March | 120 | 355,162 | 117 | 323,893 |
| February | 100 | 308,501 | 95 | 301,401 |
| January, 1927 | 117 | 362,553 | 126 | 361,277 |

### Norfolk and Newport News

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 25 | 65,640 | 77 | 214,940 |
| September | 26 | 67,249 | 87 | 240,899 |
| August | 32 | 71,356 | 92 | 222,502 |
| July | 42 | 112,442 | 77 | 201,882 |
| June | 34 | 61,041 | 82 | 190,228 |
| May | 27 | 56,458 | 70 | 179,658 |
| April | 23 | 54,983 | 77 | 209,869 |
| March | 32 | 87,970 | 98 | 264,863 |
| February | 31 | 88,928 | 77 | 232,408 |
| January, 1927 | 49 | 134,238 | 118 | 350,311 |

### Savannah

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| August, 1927 | 30 | 90,063 | 30 | 93,030 |
| July | 33 | 96,525 | 30 | 87,055 |
| June | 27 | 67,095 | 30 | 75,193 |
| May | 37 | 103,549 | 37 | 102,757 |
| April | 30 | 87,296 | 26 | 108,150 |
| March | 37 | 102,782 | 39 | 114,871 |
| February | 41 | 106,385 | 40 | 101,633 |
| January | 29 | 84,029 | 32 | 91,974 |
| December | 38 | 107,768 | 36 | 104,445 |
| November, 1926 | 40 | 97,689 | 33 | 102,822 |

### Key West

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 80 | 87,814 | 83 | 88,587 |
| September | 69 | 86,793 | 72 | 88,480 |
| August | 72 | 81,247 | 70 | 84,162 |
| July | 78 | 84,790 | 79 | 84,186 |
| June | 84 | 97,585 | 85 | 97,535 |
| May | 105 | 113,030 | 106 | 115,564 |
| April | 78 | 79,818 | 74 | 75,913 |
| March | 80 | 91,602 | 75 | 93,700 |
| February | 90 | 101,179 | 84 | 102,571 |
| January, 1927 | 89 | 116,112 | 89 | 119,191 |

### Mobile

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 89 | 210,978 | 97 | 237,282 |
| September | 80 | 172,518 | 89 | 195,714 |
| August | 92 | 194,609 | 84 | 184,655 |
| July | 94 | 198,668 | 89 | 190,965 |
| June, | 97 | 206,410 | 84 | 165,649 |
| May | 114 | 237,650 | 103 | 205,876 |
| April | 107 | 240,273 | 108 | 218,246 |
| March | 107 | 217,848 | 98 | 197,395 |
| February | 99 | 949,159 | 96 | 199,907 |
| January, 1927 | 96 | 224,819 | 83 | 191,752 |

### Seattle

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 68 | 268,666 | 69 | 272,875 |
| September | 62 | 233,554 | 58 | 227,096 |
| August | 109 | 218,218 | 102 | 203,902 |
| July | 45 | 183,023 | 40 | 162,121 |
| June | 38 | 159,687 | 39 | 162,632 |
| May | 41 | 177,869 | 42 | 169,083 |
| April | 46 | 186,581 | 49 | 185,593 |
| March | 39 | 159,034 | 44 | 175,937 |
| February | 40 | 170,776 | 45 | 195,692 |
| January, 1927 | 53 | 233,914 | 47 | 192,233 |

### New Orleans

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| September, 1927 | 232 | 613,772 | 240 | 632,593 |
| August | 276 | 797,128 | 265 | 672,392 |
| July | 250 | 615,826 | 241 | 580,228 |
| June | 248 | 606,501 | 267 | 750,937 |
| May | 277 | 640,252 | 269 | 637,452 |
| April | 262 | 642,846 | 268 | 664,467 |
| March | 276 | 712,619 | 278 | 696,983 |
| February | 240 | 632,092 | 249 | 628,782 |
| January | 240 | 697,089 | 244 | 712,284 |
| December, 1926 | 259 | 745,636 | 296 | 755,204 |

### Charleston

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| September, 1927 | 39 | 102,374 | 39 | 101,044 |
| August | 39 | 108,022 | 35 | 92,227 |
| July | 19 | 41,460 | 20 | 44,633 |
| June | 25 | 67,366 | 24 | 62,132 |
| May | 26 | 79,855 | 24 | 68,862 |
| April | 23 | 60,967 | 26 | 68,855 |
| March | 28 | 84,155 | 31 | 85,476 |
| February | 27 | 81,829 | 33 | 158,088 |
| January | 33 | 96,064 | 31 | 77,818 |
| December, 1926 | 33 | 94,427 | 39 | 102,724 |

### Galveston

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 69 | 184,154 | 99 | 290,870 |
| September | 70 | 200,573 | 97 | 301,105 |
| August | 76 | 214,876 | 95 | 274,670 |
| July | 77 | 204,961 | 93 | 260,431 |
| June | 67 | 178,331 | 75 | 199,410 |
| May | 80 | 218,443 | 101 | 281,221 |
| April | 63 | 179,757 | 88 | 265,159 |
| March | 84 | 247,873 | 98 | 307,155 |
| February | 43 | 114,628 | 82 | 248,364 |
| January, 1927 | 47 | 146,318 | 97 | 318,609 |

### Los Angeles

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 266 | 573,090 | 202 | 489,442 |
| September | 238 | 488,416 | 282 | 441,134 |
| August | 160 | 483,069 | 214 | 473,702 |
| July | 121 | 452,983 | 106 | 407,695 |
| June | 178 | 484,561 | 125 | 418,967 |
| May | 161 | 470,471 | 138 | 456,885 |
| April | 179 | 477,762 | 173 | 441,374 |
| March | 156 | 451,428 | 165 | 442,022 |
| February | 144 | 418,190 | 144 | 404,763 |
| January | 137 | 420,498 | 138 | 381,692 |
| December, 1926 | 155 | 438,464 | 123 | 386,094 |

### San Francisco

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| October, 1927 | 173 | 630,193 | 162 | 507,386 |
| September | 168 | 600,454 | 152 | 559,684 |
| August | 176 | 636,152 | 150 | 583,653 |
| June | 154 | 556,225 | 140 | 526,976 |
| May | 148 | 545,414 | 137 | 510,560 |
| April | 141 | 531,380 | 137 | 518,577 |
| March | 145 | 555,324 | 148 | 586,854 |
| February | 147 | 561,214 | 128 | 513,253 |
| January | 133 | 497,560 | 141 | 532,806 |
| December, 1926 | 134 | 520,962 | 134 | 500,347 |

### Port Arthur

(Exclusive of Domestic)

| Month | —Entrances— No. ships | Net tonnage | —Clearances— No. ships | Net tonnage |
|---|---|---|---|---|
| September, 1927 | 16 | 51,492 | 29 | 83,728 |
| August | 22 | 58,852 | 27 | 78,652 |
| July | 21 | 61,871 | 34 | 102,998 |
| June | 16 | 44,565 | 26 | 92,198 |
| May | 15 | 46,223 | 28 | 83,926 |
| April | 26 | 57,645 | 40 | 107,767 |
| March | 20 | 47,739 | 23 | 58,802 |
| February | 24 | 50,068 | 31 | 84,534 |
| January | 22 | 57,644 | 28 | 84,681 |
| December | 25 | 72,885 | 31 | 100,184 |
| November, 1926 | 25 | 67,293 | 31 | 96,177 |



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## Build Sound Steamer

Construction has commenced at the Fore River plant of the Bethlehem Shipbuilding Corp. on a new steamer for the New England Steamship Co. for service between New Bedford and the islands of Martha's Vineyard and Nantucket.

It is expected that the vessel will be ready for service by next June. She will be practically a sister ship of the ISLANDER and NOBSKA, new vessels now operating in this service. The length overall will be 210 feet, 3 inches; length between perpendiculars 202 feet; beam molded 36 feet; depth, 14 feet, 3 inches. There will be 5450 square feet of freight space area and a passenger capacity of 2000.

## Take Bids on Colliers

The Berwind-White Coal Co. has requested bids on two 6500-ton deadweight colliers for the coastwise trade. The main drive will be reduction geared turbines with steam at 400-pound pressure and with a high degree of superheat. If the contemplated design is carried out it will be the highest pressure thus far used on an American-built ship and it will go far to establish the economy of this type of power plant. The vessels are to be 365 feet in length and will be built to full ocean specifications.

## Cornbrooks Made Manager

On Nov. 9, C. L. Bardo, senior vice president of the American Brown-Boveri Electric Corp., Camden, N. J. announced that E. I. Cornbrooks has been appointed general manager of the shipbuilding division succeeding W. S. Newell who had resigned to accept a position elsewhere. The resignation of Mr. Newell was accepted with deep regret by the company. Mr. Cornbrooks came to the company as assistant general manager under Mr. Newell. He has had over twenty years of broad experience in shipbuilding and as manager of sales with the Newport News Shipbuilding & Dry Dock Co. He is very well known in shipbuilding circles in the United States and is exceptionally well fitted for the position he now occupies. An announcement was also made by Mr. Cornbrooks of the appointment of W. W. Torbet as assistant general manager. Also that the jurisdiction of Thomas R. Allen, Jr., general superintendent, is extended to cover all shops and operating departments of the shipbuilding division.

## New Cape Charles Boat

The Pennsylvania railroad has awarded a contract to the Bethlehem Shipbuilding Corp. for a boat for its Cape Charles to Norfolk service. A total of about 1500 tons of steel is involved.

# Lake Diversion Permit Declared Valid

MUCH to the disappointment of all those who are interested in maintaining the levels of the Great Lakes to at least what nature intended they should be, it has been found by Charles Evans Hughes, special master for the Supreme Court in the lake diversion cases, that Chicago is abstracting water from Lake Michigan under a perfectly clear and legal title. It will be difficult perhaps to controvert the strictly legal correctness of the findings of such an eminent jurist as Mr. Hughes. Nor will anyone doubt that his position represents a completely impartial and unbiased opinion.

But the moral right of Chicago to use water out of Lake Michigan for flushing her sanitary canal never existed and does not now exist in any greater degree due to this momentary legal victory.

When the states bordering on the Great Lakes brought suit against the sanitary district to prevent the diversion of lake water the Supreme Court on June 7, 1926 appointed former Justice Charles E. Hughes, special master, and he was directed to report his findings of fact, conclusions of law, and recommendations for a decree, all subject to the examination, consideration, approval, modification or other disposal by the court. In late November this year, Mr. Hughes' report covering 197 printed pages was submitted to the Supreme Court. The summarized conclusions of the report as published were as follows:

"1—That the complainants present a justifiable controversy.

"2—That the state of Illinois and the sanitary district of Chicago have no authority to make or continue the diversion in question without the consent of the United States.

"3—That congress has power to regulate the diversion, that is, to determine whether and to what extent it should be permitted.

"4—That congress has not directly authorized the diversion in question.

"5—That congress has conferred authority upon the secretary of war to regulate the diversion, provided he acts in reasonable relation to the purpose of his delegated authority and not arbitrarily.

"6—That the permit of March, 1925, is valid and effective according to its terms, the entire control of the diversion remaining with congress."

Mr. Hughes then goes on to say:

"In the light of these conclusions the bill, in my opinion, should be dismissed. I think, however, that if a situation should develop in which the defendants were seeking to create or continue a withdrawal of water from Lake Michigan without the sanction of congress or of administrative officers acting under its authority, the complainant states have such an interest as would entitle them to bring a bill to restrain such action.

"I therefore recommend that the bill be dismissed without prejudice to the right of the complainants to institute suit to prevent a diversion of water from Lake Michigan in case such diversion is made or attempted without authority of law."

One important point in the controversy, the amount of the falling of lake levels due to this diversion, is decided by Mr. Hughes in his report in agreement with the complainants. His findings in regard to this matter were as follows:

"The controversy, in substance, lies between about four inches and about six inches," said Mr. Hughes.

"I find that the full effect of a diversion of 8500 cubic feet a second of water from Lake Michigan at Chicago through the drainage canal of the sanitary district would be to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels, the levels of Lakes Erie and Ontario approximately five inches at mean lake levels, and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above mentioned lakes, to the same extent, respectively."

This report does not of course at this moment represent the decision of the Supreme Court of the United States and before that decision is made all those concerned will be given full opportunity to file objections and recommendations and to present their side later in oral argument.

It is very likely that there will be an important international aspect to this celebrated case before it is done. Canada will not stand mutely by and see her natural rights overridden by any ruthless municipality or state.



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# Personal Sketches of Marine Men

## H. F. Alexander, President, Pacific Steamship Co. Inc.

By Robert C. Hill

*Photo by Grady*

*STARTING as a longshoreman, on the wharves of Tacoma at 14, he is now at the age of 48 one of the leading steamship owners and operators on the Pacific coast.*

*HE IS directly responsible for the present excellent passenger and freight service between Northwest ports and California ports, having placed a fast liner on this run.*

*A FIRM believer in the discrimination of the American traveler, his company has grown and prospered by giving the utmost in service and courtesy to all patrons of the line.*

WHEN Hubbard F. Alexander, at the age of 28, in his mind's eye saw himself at the head of a great fleet flying the American flag, older men in Pacific coast shipping circles whispered that the bogey man would surely get him. At that time the present leader of Pacific shipping, had gone into business with two or three old steamships—the fleet of the Alaska Pacific Steamship Co., which he had just purchased. The bogey man was the Pacific Coast Steamship Co., which for nearly fifty years had dominated the coastwise shipping of the North Pacific. A speedy finish for Mr. Alexander at the hands of the well entrenched pioneer shipping firm was freely predicted.

The prophecy of disaster and failure proved wrong. In 1916, nine years after starting his fleet, the older company was absorbed and since then as president of the merged Pacific Steamship Co. Inc., he has been one of the outstanding figures in Pacific maritime affairs. Thus at 48, he is rounding out his twentieth year as president of a company which operates from the Mexican border to Nome, Alaska. From which it is apparent that even in these modern days, there are still chances for a young man to climb the ladder of success.

From the beginning he has tried to please the traveling public. In the early days when he operated two small steamers between Puget sound and San Francisco, he was competing with larger, faster and more luxurious liners. How to attract passengers was a problem. He solved it by sparing no expense in furnishing the tables aboard his vessels. Food, more food, the best food, the best cooked and best served food. This was his motto. Thus the Alexanderian table attained a reputation that advertised the line and brought more business. As a part of this good service, courtesy was a watchword, so that travel on the Alexander route became a habit. Likewise the shippers of freight appreciated real service and genuine courtesy. By such methods the business of the new comer in the field grew so rapidly that Mr. Alexander was able in 1916 to take over the control of the older fleet, combining the two into one company under his management.

The subject of this sketch was born in Colorado Springs, Colo. Aug. 14, 1879. At an early age the future shipping magnate moved to Tacoma with his parents. When he was but 14 years old, the family fortunes suffered reverse during the panic of 1893. And the young man began his career as a longshoreman with the old established firm of Dodwell, Carlill & Co. He was soon promoted and in the six succeeding years he acquired a well grounded knowledge of wharf practice. Then, when 20, he borrowed sufficient capital to take over the Commercial Dock Co., an institution that had been a failure. He soon put it on its feet and began a search for further maritime activities.

In 1907 he bought out the Alaska Pacific Steamship Co. but while negotiations were under way the panic struck terror into business. However, this did not deter him. He managed to raise the necessary capital, was elected president of the company and set forth on a career that probably has no equal in the annals of American shipping.

The year following, he took over the Alaska Coast Co.



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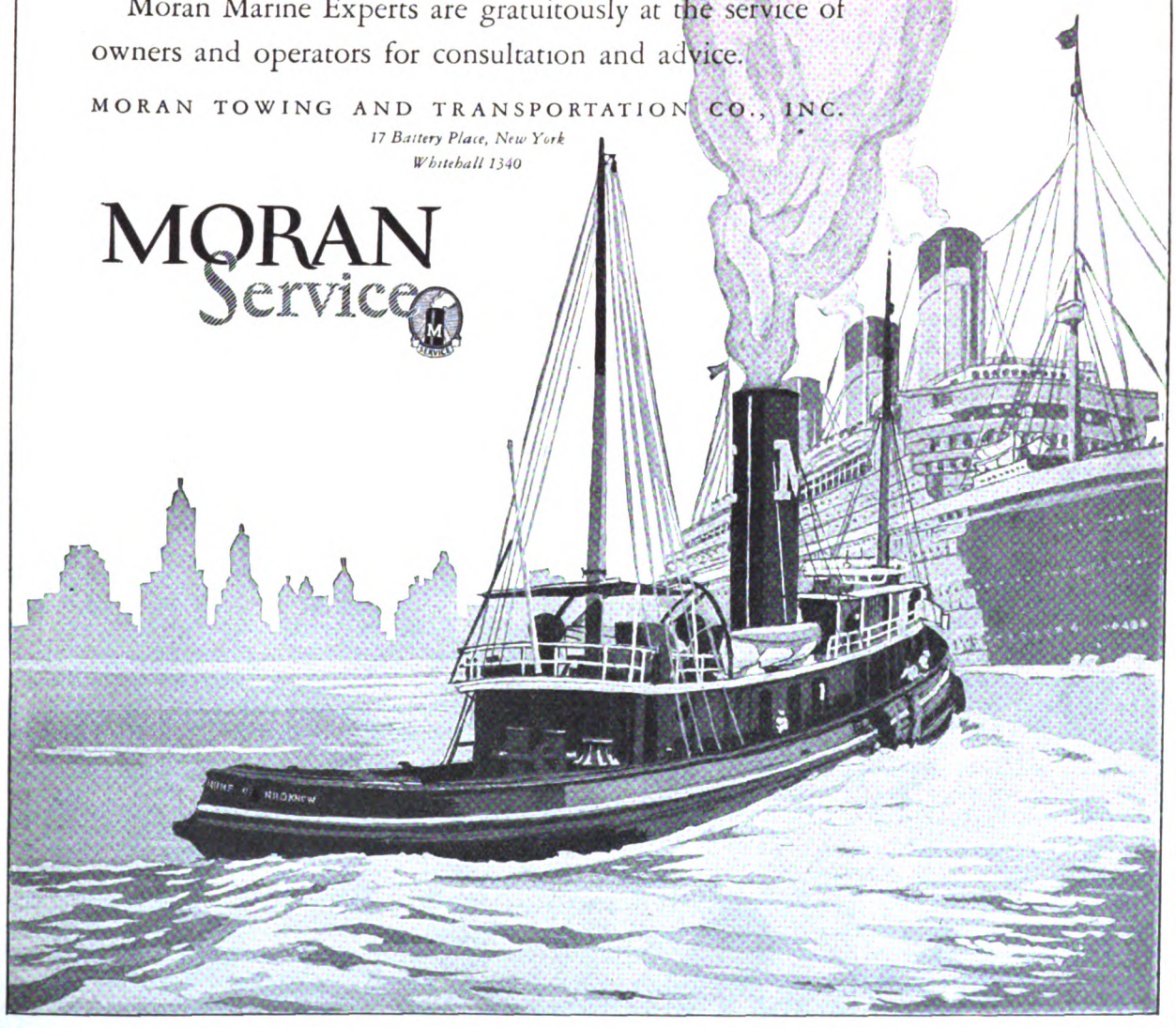




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and offered a service between California and Alaska. Competition was severe, there were many disappointments, at times it looked hopeless but the aspiring young shipowner refused to let go. By 1912 he purchased three additional vessels, bringing them from the Atlantic, the various companies being now merged into the Pacific-Alaska Navigation Co. By 1916, this company owned and operated seven vessels while the outstanding competitor, the Pacific Coast Steamship Co., had a total of thirteen. The president of the smaller fleet brought negotiations to a successful conclusion which resulted in the retirement of the Pacific Coast Steamship Co. and both fleets came to the Alexanderian flag on Nov. 1, 1916, under the name of the Pacific Steamship Co. Since then this company has been the outstanding operator between Alaska and Bering sea ports.

Early in the war period, Mr. Alexander visioned the possibilities of developing trade with the Orient under the American flag. He established a service, with his own vessels, to Japan, China, Manila and Singapore and in so doing established an organization in the Far East. Thus his company was in line to receive allocations of shipping board tonnage as soon as the government decided to enter the transpacific trade routes. In 1921, the Alexander organization received further recognition of government confidence when five of the shipping board's new passenger and freight liners were assigned for service between Puget sound and the Orient. This resulted in the organization of the Admiral Oriental line of Seattle, sold to the Robert Dollar interests last year and now known as the American Mail line.

Mr. Alexander's ambition to give the Pacific coast traveling public water transportation equal to any offered on the Atlantic was realized when he acquired the speed queen of the Pacific, now named the H. F. ALEXANDER. He originally purchased from the shipping board the steamer NORTHERN PACIFIC, which made a record as an army transport during the war. This vessel burned at sea early in 1922 when en route from New York to Chester, Pa., to be reconditioned.

This disaster was a staggering blow, especially as all plans had been made for establishing this super service for passengers during the tourist season of 1922. But with characteristic energy, Mr. Alexander began at once to formulate new plans. He offered to purchase the COLUMBIA, sister ship of the NORTHERN PACIFIC. The COLUMBIA had been the GREAT NORTHERN and had during the war made a world record in troop carrying. But the United States navy had taken the vessel over as flag ship of the Atlantic battle fleet, renaming her COLUMBIA. She fitted in so admirably that the navy objected to the proposed sale. Tangled red tape had to be unwound. There were innumerable obstacles to overcome but in the end after a hard struggle, Mr. Alexander won his point and he became the owner of this exceptionally fast vessel. Reconditioning, costing more than $500,000, was done at an Eastern yard at record breaking speed and the new vessel renamed the H. F. ALEXANDER arrived on the Pacific in June 1922 in time for the tourist travel of that season.

Since then this ocean flyer has catered to an increasing number of travelers, proving Mr. Alexander's contention that the public appreciates service. This vessel during the season makes a round trip between Seattle and Los Angeles between 5 p.m. Tuesday and 9 a.m. the following Monday morning. Previous schedules gave the ordinary coasting vessel two weeks. Travel by water between Seattle and San Francisco was reduced from the former 65 hours to 38½ hours, the regular running time of the H. F. ALEXANDER.

The maritime activities of Mr. Alexander are numerous. He has served twenty years as president of the Pacific Steamship Co. and its predecessors. This fleet consists of 19 deep sea steamers, a tug and two barges. He is also president of the Pacific Motorship Co., operating several large freighters in the coasting service he is president of the Pacific Steamship Terminal Co which built a $1,000,000 terminal in Seattle in 1925. He is interested in the Admiral Oriental line and he was one of the group who helped establish the Olympic Calpet oil refinery in Seattle. Other activities include membership on the executiv committe of the American Steamship Owners association, the American committee of Lloyd's Register and a director of the Merchant Marine Library association. For years he has been a leader in the national foreign trade council while the Seattle chamber of commerce and all other activities for the upbuilding of commerce and transportation have always received his hearty support.

While the Pacific Steamship Company originally did not serve the Columbia river, in recent years this district has become an important factor. The Alexander organization has increased its service to Portland as conditions warranted. The most recent development is the purchase on the Atlantic of the fast passenger steamers MARY WEEMS and ESTHER WEEMS. In all his career, Mr. Alexander has followed the policy of offering service in the full knowledge that it brings business.

From his army of employes, Mr. Alexander expects loyalty. He demands that they use courtesy and service as their guides in dealing with the public. Consequently he has an exceptionally fine organization, and he shows personal interest in those who work, not under him, but with him.

He has a number of hobbies among which are the S. S. H. F. ALEXANDER, his grandchild and yachting. The H. F. ALEXANDER is the apple of his eye as in giving the Pacific coast this super-service he reached the zenith of his dreams. His grandchild is part of his life, and when he finds time to relax, he cruises with his friends in his palatial sea going yacht.

Such in brief is the story of twenty years of endeavor by the longshorman who achieved the distinction of becoming one of the outstanding figures in the annals of the American merchant marine.

## Lakes Captain Dies

Capt. Hugh McAlpine, well known master of Lake ships, died Oct. 22 at his home in Lakewood, O. after an illness of about a year. Captain McAlpine was the commodore of the Cleveland and Buffalo Navigation Co.'s fleet and was master of the large lake steamer SEEANDBEE. He had been a sailor on the Great Lakes for 55 years beginning when he was 12 years of age.

## New European Director

The shipping board on Nov. 15 appointed Capt. Paul C. Grening, director for Europe for the Merchant Fleet Corp. Captain Grening is at present in London where since May of this year he has been acting director for Europe, following Joseph E. Sheedy.

Captain Grening has been identified with the Merchant Fleet Corp. since March, 1922, when he was made a port captain at London. In August of that year he was given command of the PRESIDENT HARDING, and it was during his service on that ship that the vessel performed the rescue of the crew of the INAZIO FLORIO.



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ROOSEVELT STEAM-
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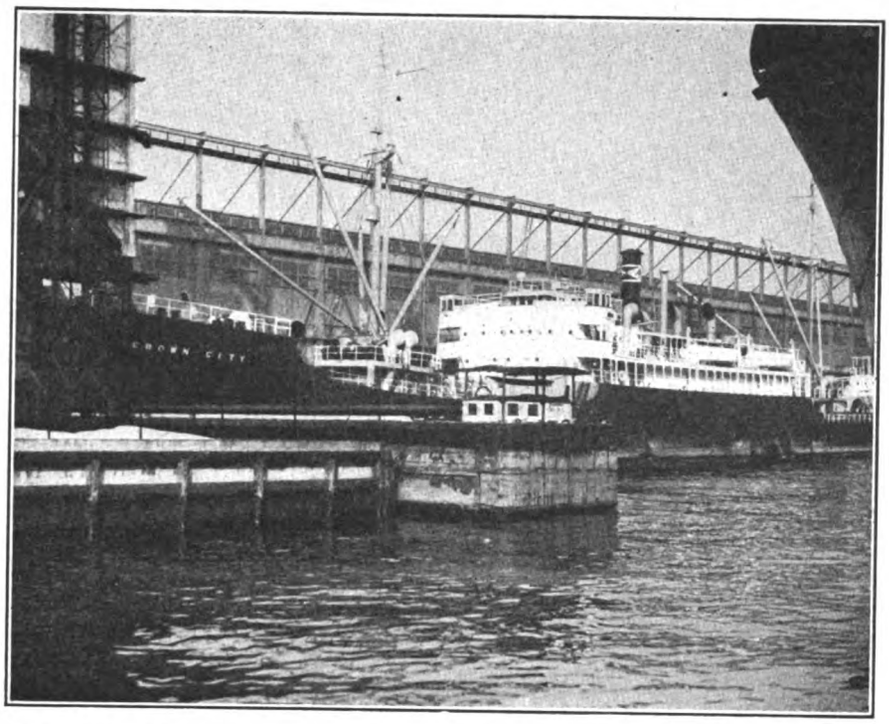

# "CROWN CITY" MAKES GREAT RECORD ON 25,641 MILE TRIP

## Lubricated with TEXACO URSA OIL for Diesel engines

## *"Not One Penny for Engine Repairs"*

The recently converted "Crown City", of the U. S. Shipping Board, has *again* demonstrated the remarkable lubricating efficiency of TEXACO URSA OIL for Diesel engine lubrication.

This ship has just completed its maiden trip as a motor vessel: A 25,641 mile round trip voyage, with the longest stretch without stop (Panama to Brisbane) 7,719 miles.

**Average for the 7,719 miles . . . . . 11.5 knots per hr.**
**Average for round trip of 25,641 miles, 10.7 knots per hr.**

The "Crown City" is driven by a 3,000 H. P. McIntosh & Seymour Single acting 4 cycle air injection Diesel engine, lubricated as follows:

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AIR COMPRESSORS .. TEXACO URSA OIL
BASE LUBRICATION .. TEXACO ALGOL OIL

(Texaco Algol oil has the same characteristics as URSA—only lighter in body.)

TEXACO URSA Oil is a clear, clean, pale colored oil; and, as this performance demonstrates, it has the proper viscosity for work.

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## Wabash Largest Carferry

(*Continued from Page* 18)

ranged for playing on all shaft bearings and crank pins. The main engine crank pins are lubricated by O'Connell greasers.

The propellers are of four bladed solid cast steel type right hand for starboard and left hand for port shaft. On account of the severe ice condition the propellers are of extra heavy construction, also there is supplied two spare propellers fully machined and ready for installation.

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## Naval Architects Meet

(*Continued from Page* 32)

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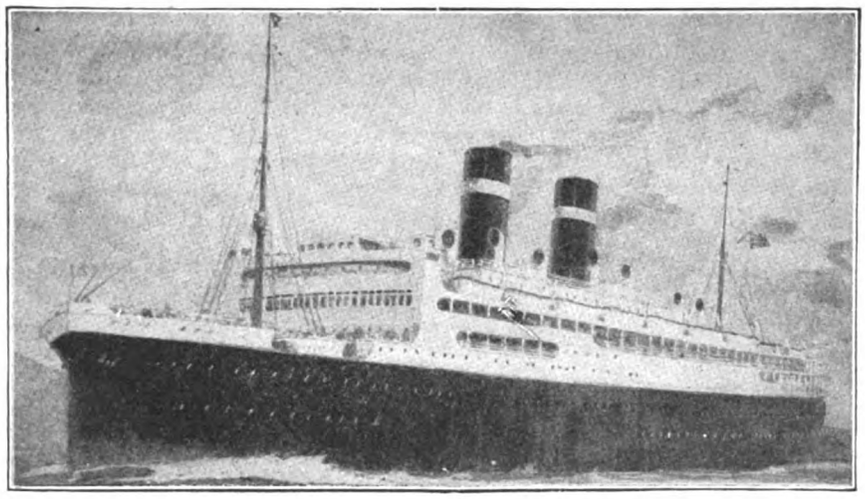

# S.S. California

## Smart Looking

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## Built to wear--- "LIKE A BATTLESHIP"

S.S. California, largest merchant ship ever built in the United States, is in every respect comparable to the finest transatlantic ships now in service. She will run between New York and California ports, her turbo-electric drive giving a speed of 18 knots.

Newport News Shipbuilding and Dry Dock Company ranks as one of the finest organizations in the world, in facilities for construction and repairs.

Our yard facilities are unequalled, labor is plentiful and good, and the climate permits outdoor work the year 'round.

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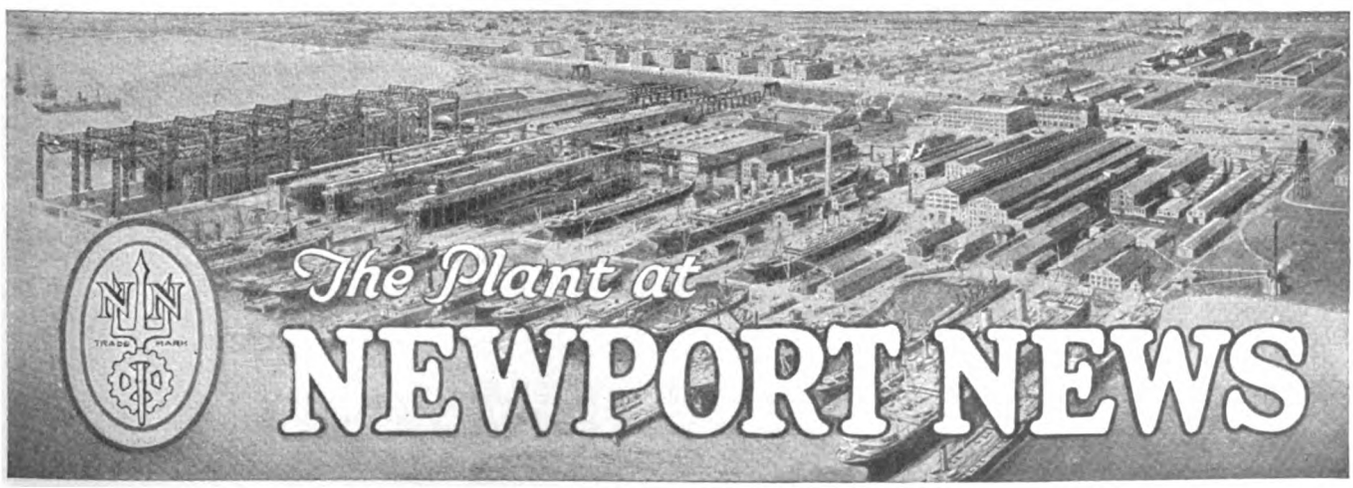




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of mail contracts. Under this plan the shipping board should determine the essential mail services and certify to the postmaster general the compensation to be paid for carrying ocean mails just as the interstate commerce commission now fixes the payment to railroads for mail transport.

Admiral Taylor is right. We have many doctors prescribing for our sick merchant marine but few of them seem to be in agreement.

## Geared Diesel Drive

(*Continued from Page* 23)

weight of the installation including the engines and gear unit, flywheels, couplings and thrust bearing is 485,000 pounds. Certain additional information is tabulated below for convenience.

### Particulars of Installation

| | |
|---|---|
| Power at low speed gear flange, b.h.p. | 2600 |
| Propeller speed, r.p.m. | 90 |
| Engine speed, r.p.m. about | 275 |
| Cylinder diameter, inches | 18 |
| Stroke, inches | 22½ |
| Height above c.l. of shaft, ft. ins. | 11—6 |
| Depth below c.l. of shaft, inches | 32 |
| Overall length of engine and gear unit, ft. ins. | 39—1½ |
| Overall width over base plate flanges, ft., ins. | 14—1 |
| Face width of gears, ins. | 30 |
| Net width of teeth, ins. | 25 |
| Diametral pitch, d.p. | 2 |
| Pitch circle diameter of low speed gear, ins. | 76½ |
| Pitch circle diameter of pinion, ins. | 25 |
| Angle of teeth, degrees | 30 |
| Number of teeth, gear | 153 |
| Number of teeth, pinion | 50 |
| Diameter of crank, main bearing pins, ins. | 10¼ |
| Diameter of low speed gear bearings, ins. | 15 |
| Diameter of pinion bearing, ins. | 12 |
| Diameter of line shafting, ins. | 12⅝ |
| Diameter of tail shafting, ins. | 14¼ |
| Diameter of propeller, ft. ins. | 17—9 |
| Pitch of propeller, ft. ins. | 13—3 |

The connection between the crankshafts of the engines and the pinions which mesh with the low speed gear is by means of 6000-pound Falk flexible couplings. The degree of rigidity of these couplings and the masses of the flywheels were definitely selected to place the critical speed at the most favorable point. The advantage of the flexible coupling is in that it introduces an articulation between the crankshaft and the pinion. The entire geared unit is narrow and its foundation in the vessel is structurally very rugged. Thus the gear is subjected only very slightly to any deformation due to the working of the ship's structure.

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The total cost of the conversion of the HERMAN FALK, a vessel of 431 feet in length between perpendiculars and of 59.2 feet beam; of 31.4 feet depth and deadweight capacity of 10,200 tons was low. Shipyard work including the complete installation, drydocking, overhauling, painting and repairs amounted to $193,520. The two main engines complete with reduction gear, amounted to $185,000. One, 110 kilowatt generating set driven by a three cylinder 165 brake horsepower Falk oil engine complete with General Electric generator; one, No. 5 Sturtevant scavenging blower and General Electric motor; one, Schutte and Koerting geared lubricating oil pump with General Electric motor; one five-inch Allis Chalmers centrifugal cooling water pump with G.E. motor; two Rix starting air compressors with 25 brake horsepower American Blower Co.'s steam engines; two 51-inch diameter 11 feet 7½ inches long, 350-pound pressure, starting air receivers; one, DeLaval oil purifier; one, four-inch duplex lubricating oil strainer; one fuel oil drip tank with pump; two recording gages for cooling water and lubricating oil pressure with siren alarms; one Bacharach indicator; two 16-inch Maxim silencers for main engine; one, 8-inch Maxim silencer for auxiliary engine; and one fuel oil float tank with strainer; all came to $35,095. So that the total conversion cost of this tanker was $413,615.

The two wing boilers of the original installation were retained for the purpose of heating the heavy grades of fuel or crude oil which are carried as freight. Consequently this tanker is fit to carry any liquid freight in bulk, such for instance as molasses, cocoa oil any grade of fuel or crude oil and gasoline. It is thus different from the special tankers which carry only gasoline, kerosene or diesel oil. Such tankers do not require an extensive boiler plant but this tanker is equipped to carry all kinds of oil which may be offered.

## Pulverized Coal Used

(*Continued from Page* 19)

to the furnace to a plain, simple, front and is connected to it tangentially. The fine coal then hitting an arrangement of vanes is given great turbulence. This turbulence combined with super-fineness makes it possible to entirely burn the necessary amount of coal and to keep the flame all within the furnace. The flame does not even reach the extreme end of the back connections. What is left in the form of ash or residue is a light powder which is mainly blown out with the soot blower.

The successful design of the burner which is undoubtedly the most important component part of the equipment is due to the Peabody Engineering Corp. which has done a great deal of work of an experimental nature. This company has also had experience with a number of successful pulverized coal installations for stationary purposes.

The coal bunkers for the MERCER had to be arranged in the best possible manner under the circumstances. On a new vessel they could of course be designed with their convenience for the crushers and mills specifically in mind. As it is on this vessel the coal is conveyed by ordinary bucket conveyors to the crusher located on the main deck above the mill compartment on either side of the ship. The crusher needs only to work for a few minutes per watch or perhaps an hour or so a day to deliver the necessary amount of coal needed. This crushed coal moves by gravity to a day supply hopper located over each mill. The amount of coal which to feed from the hopper to the mill can, of course, be regulated. Once pulverized, however, it must have a place to flow to, that is to the burners without restriction.

### Mercer Sails for Rotterdam

In order to give everyone interested in the subject a chance to observe the S. S. MERCER under operating conditions, dock trials were held at Hoboken, N. J. during the meeting of the naval architects and on Nov. 15 and 16 sea trials were held in New York bay. At all of these trials observers have remarked on the complete success of the entire system.

The S. S. MERCER was to load at Philadelphia and was scheduled to sail on Nov. 21 for Rotterdam. The two men who have had more intimately to do with this job than any other, Carl E. Jefferson and Commander J. S. Evans, are sailing on the vessel with a staff of assistants and it is expected that some definite accurate and interesting data on the performance of this vessel will be available to shipping men on her return to the United States.

## Open Bath Iron Works

Plans are rapidly developing for resumption of operations on a fairly good scale at the new Bath Iron Works Co. The new interests plan to take over the major part of the Keyes Fiber Co.'s interests in the old Bath Iron Works here. Looking toward the resumption of operations on a fairly good scale it is stated that contracts have already been completed for the building of three yachts. Production will begin within a short time. The plans now standing call for a working force of between 700 and 800 men by the early spring of 1928.



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# Magic rubber tube

## *cuts material handling cost*

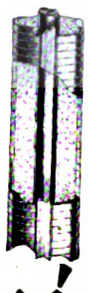
### *Read what amazingly long life it gives the rugged Exide-Ironclad Battery*

THAT odd-looking slotted rubber tube certainly works wonders, but the way it does it is really very simple.

There are dozens of these unique slotted-rubber tubes in the actual Exide-Ironclad Battery, each about as large as a fat lead pencil. Packed in each tube is the active material, where it is held like coffee in a percolator or tea leaves in a cotton bag. The liquid easily penetrates through the slots, but the solid matter is so retained as to greatly prolong the battery's life.

That's why this ingenious principle has doubled battery life. At the same time the Exide-Ironclad is able to maintain a fast speed and develop tremendous power on grades or under heavy loads. The battery charges easily, too, taking current in quickly, and with little waste.

*The Exide-Ironclad positive plate consists of a metal frame from which extend vertical metal conducting rods, each surrounded by active material and cased in a slotted rubber tube.*



*Cross-section showing how the rubber tube retains in place and retards the loss of the active material of the plate. The slits give the electrolyte free access to the active material.*

*Try one and you'll order more*

Until you see how smoothly and steadily an Exide-Ironclad Battery hustles your electric industrial trucks, you can have no idea how much difference this powerful battery will make in your material handling costs.

Thousands of Exide-Ironclads are now in use all over the country. Leading companies in every line operate them. Many of these companies at first bought one or two Exide-Ironclads for comparison and now use nothing else. Try one of these wonderful batteries in your industrial trucks.

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Gentlemen: Without any obligation on my part please ☐ have your nearest representative call; ☐ send me a free copy of your booklet, "Facts for consideration in selecting a Storage Battery."

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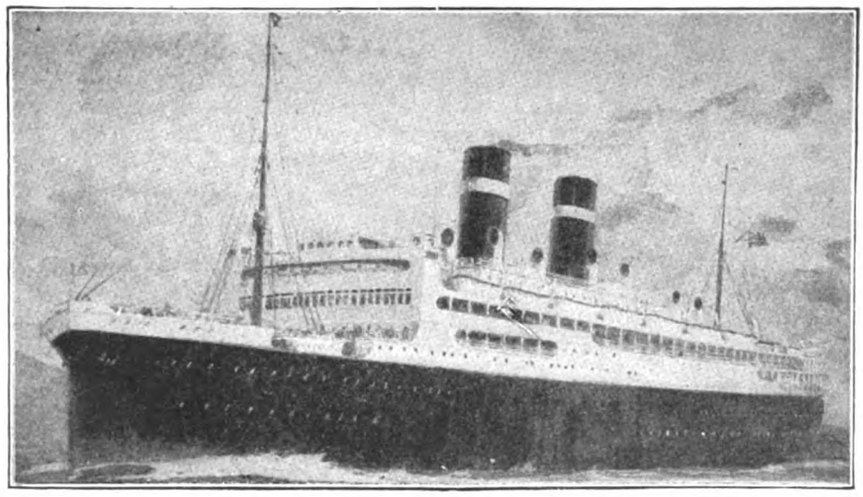

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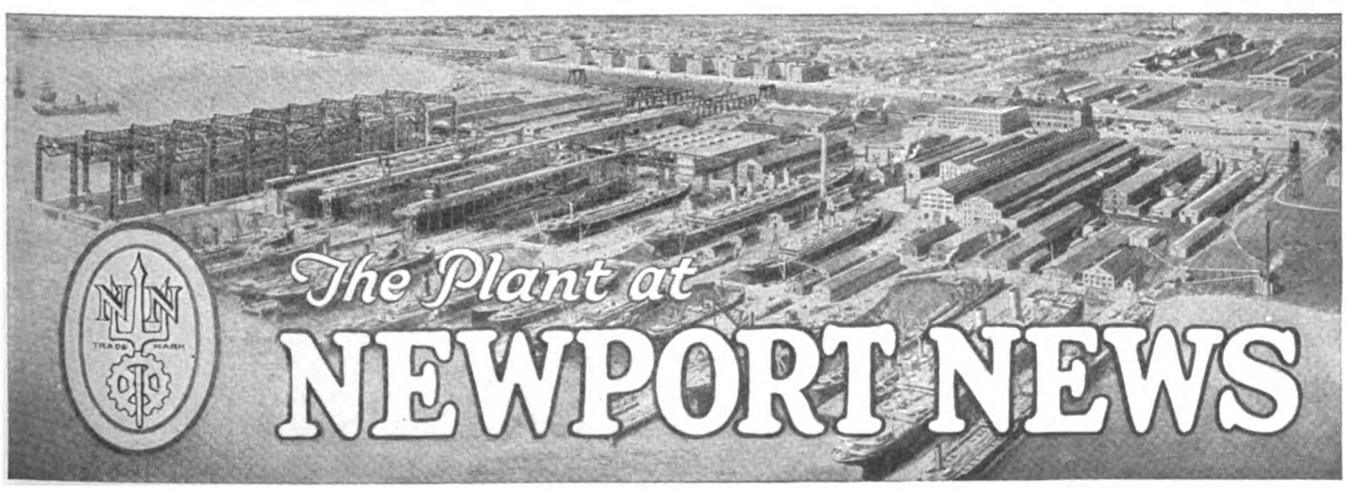




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(*Continued from Page* 23)

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## Pulverized Coal Used

(*Continued from Page* 19)

to the furnace to a plain, simple, front and is connected to it tangentially. The fine coal then hitting an arrangement of vanes is given great turbulence. This turbulence combined with super-fineness makes it possible to entirely burn the necessary amount of coal and to keep the flame all within the furnace. The flame does not even reach the extreme end of the back connections. What is left in the form of ash or residue is a light powder which is mainly blown out with the soot blower.

The successful design of the burner which is undoubtedly the most important component part of the equipment is due to the Peabody Engineering Corp. which has done a great deal of work of an experimental nature. This company has also had experience with a number of successful pulverized coal installations for stationary purposes.

The coal bunkers for the MERCER had to be arranged in the best possible manner under the circumstances. On a new vessel they could of course be designed with their convenience for the crushers and mills specifically in mind. As it is on this vessel the coal is conveyed by ordinary bucket conveyors to the crusher located on the main deck above the mill compartment on either side of the ship. The crusher needs only to work for a few minutes per watch or perhaps an hour or so a day to deliver the necessary amount of coal needed. This crushed coal moves by gravity to a day supply hopper located over each mill. The amount of coal which to feed from the hopper to the mill can, of course, be regulated. Once pulverized, however, it must have a place to flow to, that is to the burners without restriction.

### Mercer Sails for Rotterdam

In order to give everyone interested in the subject a chance to observe the S. S. MERCER under operating conditions, dock trials were held at Hoboken, N. J. during the meeting of the naval architects and on Nov. 15 and 16 sea trials were held in New York bay. At all of these trials observers have remarked on the complete success of the entire system.

The S. S. MERCER was to load at Philadelphia and was scheduled to sail on Nov. 21 for Rotterdam. The two men who have had more intimately to do with this job than any other, Carl E. Jefferson and Commander J. S. Evans, are sailing on the vessel with a staff of assistants and it is expected that some definite accurate and interesting data on the performance of this vessel will be available to shipping men on her return to the United States.

## Open Bath Iron Works

Plans are rapidly developing for resumption of operations on a fairly good scale at the new Bath Iron Works Co. The new interests plan to take over the major part of the Keyes Fiber Co.'s interests in the old Bath Iron Works here. Looking toward the resumption of operations on a fairly good scale it is stated that contracts have already been completed for the building of three yachts. Production will begin within a short time. The plans now standing call for a working force of between 700 and 800 men by the early spring of 1928.



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# Magic rubber tube

## *cuts material handling cost*

### *Read what amazingly long life it gives the rugged Exide-Ironclad Battery*

THAT odd-looking slotted rubber tube certainly works wonders, but the way it does it is really very simple.

There are dozens of these unique slotted-rubber tubes in the actual Exide-Ironclad Battery, each about as large as a fat lead pencil. Packed in each tube is the active material, where it is held like coffee in a percolator or tea leaves in a cotton bag. The liquid easily penetrates through the slots, but the solid matter is so retained as to greatly prolong the battery's life.

That's why this ingenious principle has doubled battery life. At the same time the Exide-Ironclad is able to maintain a fast speed and develop tremendous power on grades or under heavy loads. The battery charges easily, too, taking current in quickly, and with little waste.

*Try one and you'll order more*

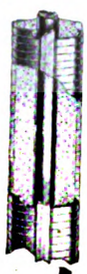
Until you see how smoothly and steadily an Exide-Ironclad Battery hustles your electric industrial trucks, you can have no idea how much difference this powerful battery will make in your material handling costs.

Thousands of Exide-Ironclads are now in use all over the country. Leading companies in every line operate them. Many of these companies at first bought one or two Exide-Ironclads for comparison and now use nothing else. Try one of these wonderful batteries in your industrial trucks.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

*Exide Batteries of Canada, Limited, Toronto*

*The Exide-Ironclad positive plate consists of a metal frame from which extend vertical metal conducting rods, each surrounded by active material and cased in a slotted rubber tube.*



*Cross-section showing how the rubber tube retains in place and retards the loss of the active material of the plate. The slits give the electrolyte free access to the active material.*

**Exide**
**IRONCLAD**
**BATTERIES**

The Electric Storage Battery Company
Allegheny Ave. & 19th St., Philadelphia, Pa.

Gentlemen: Without any obligation on my part please ☐ have your nearest representative call; ☐ send me a free copy of your booklet, "Facts for consideration in selecting a Storage Battery."

Name_____

Company_____

Address_____



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## Malolo Begins Service

(*Continued from Page* 39)

All scupper drains may be closed, either on the port or starboard sides, or on both sides, this operation being controlled from a central station on the bridge. This feature means that all exits for waste water may be closed, so that, in case of a list in the ship, the ocean water cannot flow up the drains and flood the ship. This feature, combined with her breadth of beam, make the MALOLO as unsinkable as it appears possible to make a ship.

In this connection may be cited the remarkable trial test of the MALOLO. On the trial trip she was rammed by a Norwegian freighter. The total punctured area was equal to a pipe more than 9 feet in diameter, and most of it was under the water line. Admiral Taylor who was aboard the ship at the time, said that the damage inflicted by the collision was the equal of that which which would be sustained had the ship been rammed by a well-placed torpedo. As a result of the collision, both boiler rooms were flooded almost instantly. Yet the list of the ship was almost negligible. Because the boilers were put out of commission, the ship had to be towed to port, but she was not in danger at any time. She was repaired at the Morse Drydock & Repair Co., Brooklyn, N. Y.

Twin screws, operated by geared turbines, of 25,000 shaft horsepower, propel the MALOLO, giving her a speed of 22 knots. The turbines are supplied with steam by a battery of 12 Babcock and Wilcox marine water-tube boilers. These are oil-burning and are arranged in two boiler rooms which are separated by water-tight bulkheads. The MALOLO has a draft, when loaded, of 28 feet 6 inches. The total cargo space is 227,000 cubic feet. This includes the refrigerated cargo space. The fuel capacity is 4500 tons of oil.

Only first class passengers, to the number of 693, are carried by the MALOLO. She has 274 staterooms containing 481 beds. In addition she has 172 Pullman berths. There are seven promenade decks, and they are served by two elevators. There are two motion picture theaters, and there is a swimming pool among the largest to be possessed by any ship. A remarkable feature is that all cooking is done by electricity. A feature of the MALOLO is the refrigerated cargo space which will be used for bringing fruit from Honolulu to the United States.

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The old established firm of W. H. McMillan's Sons, manufacturers of tackle blocks and other marine specialties, on Nov. 1 moved their New York office and sales room from 153 South street to 49 South street.

# Compensation Act in Force

TRADESMEN who occasionally work aboard vessels were provided with compensation rights in the longshoremen's and harbor workers' compensation act, effective July 1 of this year. Employes who are sent on board for any purpose connected with the ship's business are included. Among these are ship chandlers, repair men of all sorts, and installers of special equipment, such as lighting, heating, ventilating, refrigerating, and radio appliances. Cargo handlers, other than members of the crew are also beneficiaries.

Compensation ranges from $8.00 to $25.00 per week in addition to medical expense. Provision is also made for dependents in case of death from injury:

Employers, subject to the law, no matter how infrequently, are required to carry insurance protection either with an authorized carrier, or by obtaining from the commission a permit to self-insure. A fine of $1000 and imprisonment are provided for failure to comply with these provisions.

The administration of this act is entrusted to the United States employes compensation commission, Washington. The country has been divided into fourteen districts with offices in the following cities: Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans, St. Louis, Chicago, Cleveland, Louisville, Galveston, San Francisco, and Seattle.

In making a survey, commissioners in some districts at least have found that there are many firms who, having work to do on vessels or equipment to install, are unaware that when men are sent on board they are not under the protection of the state compensation law.

The commission is endeavoring in all respects to co-operate with all employers affected by this law.

## Rudder of New Type

(*Continued from Page* 24)

fraction of the rudder area, little energy is required to move it so that the steering engine may be replaced by a small electric motor or by hand gear.

There is a definite reduction in hull resistance with this type of rudder due to the fact that it acts automatically whenever any force tends to deflect the ship off its true course. With the old style rudder the steersman wishing to correct the course of the ship turns the steering wheel. Even if skillful it is unavoidable not to turn the rudder too far making it necessary for another correction in the other direction. In the case of a highly experienced steersman or an automatic steering apparatus, the rudder is operated only after the vessel has started to veer from its course. Whenever a force acts tending to deflect a ship off its course the Flettner rudder will swing out of the way and automatically returns to its correct position without affecting the motion of the ship itself which means lesser actual distance traveled by the vessel and the reduction in resistance to forward motion due to angles of helm to keep the vessel on its course.

---

## October Lake Levels

The United States Lake survey reports the monthly mean stages of the Great Lakes for the month of October as follows:

| Lakes | Feet above mean sea level |
|---|---|
| Superior | 602.73 |
| Michigan-Huron | 579.10 |
| St. Clair | 574.12 |
| Erie | 571.32 |
| Ontario | 244.99 |

Lake Superior was 0.03 foot higher than in September and it was 1.10 feet higher than the October stage of a year ago. Lakes Michigan-Huron were 0.06 foot lower than in September and they were 0.76 foot higher than the October stage of a year ago. Lake Erie was 0.36 foot lower than in September and it was 0.39 foot lower than the October stage of a year ago. Lake Ontario was 0.28 foot lower than in September and it was 0.06 foot higher than the October stage of a year ago, and 0.45 foot below the average stage of October of the last ten years.

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The export office of the George Stratford Oakum Co. has been changed from 26 Water street to 35 South William street, New York city. This office is under the management of E. E. Smith.



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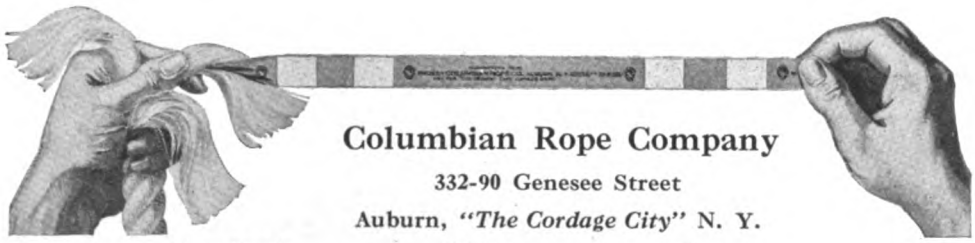
# *Columbian's Ten Points of Superiority*

## These ten characteristics of every Columbian *Tape-Marked* Pure Manila Rope

will show every rope user that he is getting more for his money when he buys Columbian. They will also point out the special advantages of using this Guaranteed Rope.

1. Made from manila fibre, specially selected by Columbian representatives in the Philippine Islands.
2. Made in the most modern cordage mills in the world.
3. Made on positive drive machinery.
4. Perfect and uniform construction.
5. Water resisting.
6. Always flexible.
7. Exceptional service.
8. No greater cost.
9. ***Tape-Marked.***
10. Every foot guaranteed.



**Columbian Rope Company**
332-90 Genesee Street
Auburn, *"The Cordage City"* N. Y.

**Branches:** **New York** **Chicago** **Boston** **New Orleans**

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# Late Flashes On Marine Disasters

## Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

| Name | Date | Nature | Place | Damage Resulting |
|---|---|---|---|---|
| Arslan II | Sept. 4 | Ashore | Kilia Lighthouse | Not stated |
| Astronomer | Sept. 2 | Aground | Sankral Point | Floated |
| Alexandrite | Sept. 8 | Disabled | Off Flamboro Hd. | Lost propeller |
| Azimuth | Sept. 9 | Collision | Ymuiden | Considerable |
| Amersfoot | Sept. 21 | Ashore | Off Costa Rica | Not stated |
| Adriana | Sept. 14 | Aground | Buenos Aires | Floated |
| Atalanta | Sept. 12 | Hvy weather | Liverpool | Leaking |
| Audun | Sept. 14 | Collision | Kaiser Wilhelm Canal | Side plates |
| Ascania | Sept. 25 | Disabled | London | Port engine |
| Ave Maria | Sept. 26 | Collision | New Bedford | Stern post |
| A. Brooke Taylor | Sept. 27 | Aground | Fox Shoals | Floated |
| Anna C | Sept. 14 | Aground | Victoria | Bottom—floated |
| Arlyn | Oct. 5 | Disabled | Key West | Machinery |
| Brush | Sept. 16 | Disabled | New York | Engine |
| Bastidas | Sept. 20 | Disabled | New York | Engine |
| Beemsterdijk | Sept. 20 | Collision | Houston Ship Channel | Considerable |
| Bracondale | Sept. 20 | Ashore | Colon | Floated |
| Ben Rein | Sept. 2 | Disabled | Barry | Engine |
| British Star | Sept. 7 | Struck jetty | Pembroke | Stem |
| Benue | Sept. 16 | Collision | Bathurst | Bow plates: stem |
| Bear Ridge | Sept. 29 | Sank | Off Cape May | |
| Barrie | Sept. 14 | Collision | Montreal | Stem; plates |
| Berengar | Sept. 16 | Aground | Hamburg | Floated |
| Bohemian Club | Oct. 4 | Collision | Philadelphia | Stern |
| Barbara C | Oct. 4 | Struck bar | Aberdeen | Rudder |
| Baron Kelvin | Sept. 23 | Aground | Hooghli | Not stated |
| Borderland | Sept. 25 | Collision | River Weser | Bow plates |
| Birk | Oct. 11 | Ashore | Old Providence Isl. | Not stated |
| Commercial Spirit | Sept. 10 | Aground | Texas City Ship Channel | Floated |
| Camden | Sept. 19 | Hvy weather | Panama | Damaged |
| Chattanooga City | Sept. 20 | Collision | Houston Ship Channel | Bow |
| Corby Castle | Sept. 21 | Disabled | New York | Boiler |
| Circinus | Sept. 21 | Ashore | So. of San Diego | Floated |
| City of Rayville | Sept. 1 | Aground | Pearl Rock | Floated—leaking |
| Constance | Sept. 2 | Aground | River Mersey | Floated |
| Corinaldo | Sept. 6 | Collision | Flushing | Damaged |
| Casamance | Sept. 6 | Collision | Flushing | Damaged |
| Crofton Hall | Sept. 29 | Collision | River Plate | Bows; plates stem; deck |
| Conemaugh | Sept. 29 | Collided dock | Bayonne | Damaged |
| Copthorne | Sept. 24 | Aground | Richibucto Harbor | Floated |
| Chas. Pratt | Sept. 30 | Disabled | Panama | Boiler |
| Corrales | Sept. 23 | Aground | Lake Washington | Floated |
| Colorado Springs | Sept. 21 | Struck quay wall | Glasgow | Stem; plates |
| Colmar | Oct. 7 | Sprang leak | Newport | Sank |
| Daisy | Sept. 15 | Ashore | Muddy Point | Floated—considerable |
| Dryden | Sept. 18 | Collision | Overfalls Lightship | Considerable |
| Dorothy | Sept. 1 | Struck rocks | La Romana | Bows |
| Dominic | Sept. 3 | Aground | Matura | Not stated |
| Doric | Sept. 14 | Collision | Montreal | Bow plate |
| Duplelx | Sept. 14 | Collision | Buenos Aires | Not stated |
| Delaware | Oct. 4 | Aground | Houston Channel | Aground |
| Dewstone | Sept. 29 | Ashore | Lake Ontario | Not stated |
| Egypt Maru | Sept. 12 | Aground | Nr. Alberoni | Floated |
| Emperor of Montreal | Sept. 11 | Disabled | Bermuda | Machinery |
| Edwina | Sept. 6 | Ashore | Rathlin Island | Floated—propeller |
| Elif | Sept. 10 | Hvy weather | Nr. Zongouldak | Sank |
| Everene | Sept. 15 | Collided pier | Kaiser Wilhelm Canal | Not stated |
| Eretza Mendi | Sept. 19 | Collision | No. of Ile de Bas | Forepeak; stem |
| Eros | Sept. 30 | Collision | Hamburg | Port side |
| Ereno | Sept. 28 | Collided quay wall | Swansea | Paltes; stem bar |
| Federal | Sept. 21 | Ashore | Southwest Pass | Floated |
| Fair Helga | Aug. 29 | Sprang leak | East of Tongast River | Total loss |
| Fulton | Aug. 30 | Gale | Rostock | Capsized |
| Fullerton Rose | Sept. 6 | Aground | Port Talbot | Floated |
| Floribelle | Sept. 5 | Collision | Grimsby | Damaged |
| Faro | Sept. 8 | Ashore | Warnemunde | Floated |
| Flosshilde | Sept 14 | Collision | Kaiser Wilhelm Canal | Side plates |
| F. J. Luckenback | Oct. 4 | Collision | Philadelphia | Port bow |
| Frieda | Sept. 26 | Collision | Brunsbuttelkoog | Damaged |
| Freya | Sept. 23 | Struck pierhd. | Liverpool | starboard hawsepipe |
| Fano | Sept. 28 | Aground | Brunsbuttelkoog | Rudder-floated |
| Grenadier | Sept. 6 | Fire | Oban | upper structure; deck |
| Gauntlet | Sept. 5 | Aground | Horse Shoe Bank | Floated |
| Godhem | Sept. 7 | Ashore | Port Westman | Considerable |
| Golden Eye | Sept. 14 | Explosion | Harwich | Sank |
| Gerzen | Sept. 29 | Aground | Kaiser Wilhelm Canal | Floated |

| Name | Date | Nature | Place | Damage Resulting |
|---|---|---|---|---|
| Hagarty | Sept. 14 | Aground | Stag Island | Floated |
| Harvey H. Brown | Sept. 13 | Collision | Marsh Bay | Starboard side; bow |
| Heathside | Sept. 8 | Aground | Sligo | Floated |
| Haralampos P. | Sept. 13 | Collision | Blyth | Not stated |
| Hubro | Sept. 22 | Disabled | Hong Kong | Engines |
| Inga | Sept. 6 | Collision | Burntisland | Sank |
| Ione | Sept. 9 | Fire | Antwerp | Not stated |
| Irene | Sept. 16 | Collision | Waterford | Damaged |
| I L Elwood | Oct. 3 | Struck pier | South Chicago | Forward |
| Junita | Sept. 14 | Aground | Providence | Floated |
| John Worthington | Sept. 18 | Ashore | New Orleans | Floated |
| Jan | Sept. 29 | Aground | Lower Hope | Floated |
| Josef Bergendorff | Sept. 29 | Struck buoy | Eastham Channel | Propeller |
| Kastoria | Sept. 5 | Collision | Grimsby | Not stated |
| Koolinda | Sept. 13 | Aground | Perth | Rudder |
| Kildale | Oct. 8 | Ashore | Buenos Aires | Not stated |
| Konsul Carl Fisser | Sept. 28 | Stranded | Jakobsholmen | Floated |
| Kekoskee | Oct. 11 | Collision | Off Point Arquello | Not stated |
| Lavinia M. Snow | Sept. 16 | Aground | Portland | Floated |
| Lancashire | Sept. 8 | Aground | Waterford | Floated |
| Liverpool Maru | Sept. 14 | Aground | English Bank | Floated |
| Lancastria | Oct. 4 | Collision | Thames River | Starboard side |
| Louisiana | Oct. 8 | Aground | Ebbjerg | Floated |
| Ludovic Mrazec | Sept. 22 | Collision | Dardanelles | Sank |
| Louis Mercier | Sept. 28 | Collision | Elbe River | Bows |
| Michael Gallagher | Sept. 21 | Struck pier | Racine | Wheel; rudder; shoe |
| Mirabella | Aug. 28 | Aground | River Ilheos | Floated |
| Mangalore | Sept. 2 | Aground | Achipur Sands | Floated |
| Marlowe | Sept. 13 | Collision | Nr. Birkenhead | Starboard side |
| Marienfels | Sept. 14 | Fire | Aden | No. 3 hold |
| Martha Buehner | Sept. 15 | Collision | San Francisco | Deck fittings |
| Michigan | Sept. 28 | Fire | Houston | No. 2 hold |
| M. scow | Oct. 4 | Fire | New York | Considerable |
| Manuata | Oct. 1 | Ashore | La Have River | Floated |
| New York | Sept. 16 | Disabled | New York | Engine |
| Nenon | Sept. 6 | Collision | San Diego | Damaged |
| Niagara | Sept. 29 | Collision | River Plate | Starboard side |
| Nobiskrug | Sept. 28 | Collision | Elbe River | Sank |
| Olean | Sept. 20 | Disabled | Philadelphia | Boiler |
| Orestes | Sept. 15 | Collision | Swansea | Not stated |
| Ontario | Oct. 13 | Sank | Nr. Outer Island | |
| Point Sur | Sept. 20 | Disabled | Panama Canal | Machinery |
| Perseus | Sept. 1 | Struck dock wall | Buenos Aires | Not stated |
| Pearl | Sept. 8 | Ashore | Trinity Bay | Total loss |
| Pure Tiolene | Sept. 22 | Collision | Philadelphia | Not stated |
| P. Madsen | Sept. 13 | Collision | Blyth | starboard side |
| Pinguino | Sept. 15 | Sank | Tampico | |
| Portsmouth | Oct. 4 | Sank | Brazos River | |
| Quellayute | Sept. 18 | Struck sub. object | Seattle | Propellers |
| River Fisher | Oct. 4 | Collision | Thames River | Not stated |
| Rio Negro | Sept. 19 | Aground | Buenos Ayres | Not stated |
| San Felix | Sept. 15 | Disabled | Antofagasta | Machinery |
| San Giuseppe | Sept. 18 | Collision | Overfalls Lightship | Starboard side |
| Stranger | Sept. 18 | Fire | So. of Tampa Bar | Ashore |
| Sophie Rickmers | Aug. 26 | Stranded | East of Samso | Floated |
| Shickchinny | Aug. 29 | Struck pier | Canada Dock | Stem; plates |
| Star of the South | Sept. 6 | Ashore | Goat Island | Not stated |
| Sumidagawa Maru | Sept. 6 | Ashore | Osaka | Total loss |
| Svava | Sept. 12 | Disabled | Ymuiden | Leaking |
| Silkeborg | Sept. 15 | Aground | Kiel | Floated |
| Sabotawan | Oct. 6 | Disabled | So. of San Francisco | Lost prop. |
| St. Enogat | Sept. 19 | Struck sub. object | Brest | Leaking |
| Snefjeld | Sept. 22 | Aground | Halsnoerbraaen | Floated-forepeak |
| Suscolanco | Sept. 21 | Disabled | San Francisco | Machinery |
| Solfrid | Sept. 26 | Disabled | Cuxhaven | Machinery |
| Salvation Lass | Sept. 28 | Collision | Santos | Rudder |
| Samland | Sept. 30 | Aground | Peterhead | Floated |
| Tregantle | Sept. 13 | Struck reef | Port Sudan | Considerable |
| Trifels | Sept. 3 | Aground | Sankral Point | Floated |
| Trontolite | Sept. 14 | Aground | Vancouver Harbour | Floated |
| Trude | Sept. 15 | Aground | Kiel | Floated |
| Tracy Brothers | Oct. 6 | Disabled | Off Highlands | Engine |
| Theano | Sept. 21 | Disabled | Off Copeland Is. | Engine |
| Vaarli | Sept. 21 | Collision | Curacao | Starb'rd side |
| Vesta | Sept. 21 | Collision | River Scheldt | Not stated |
| West Ira | Sept. 15 | Disabled | Off Southwest Pass | Engine |
| Weichsel | Sept. 15 | Disabled | Not stated | Machinery; steering gear |
| Westover | Oct. 3 | Stranded | Newport News | Floated-leaking |
| West Wales | Sept. 22 | Aground | Buenos Aires | Floated |
| Yokohama | Sept. 9 | Struck jetty | Methil | Bows; plates |



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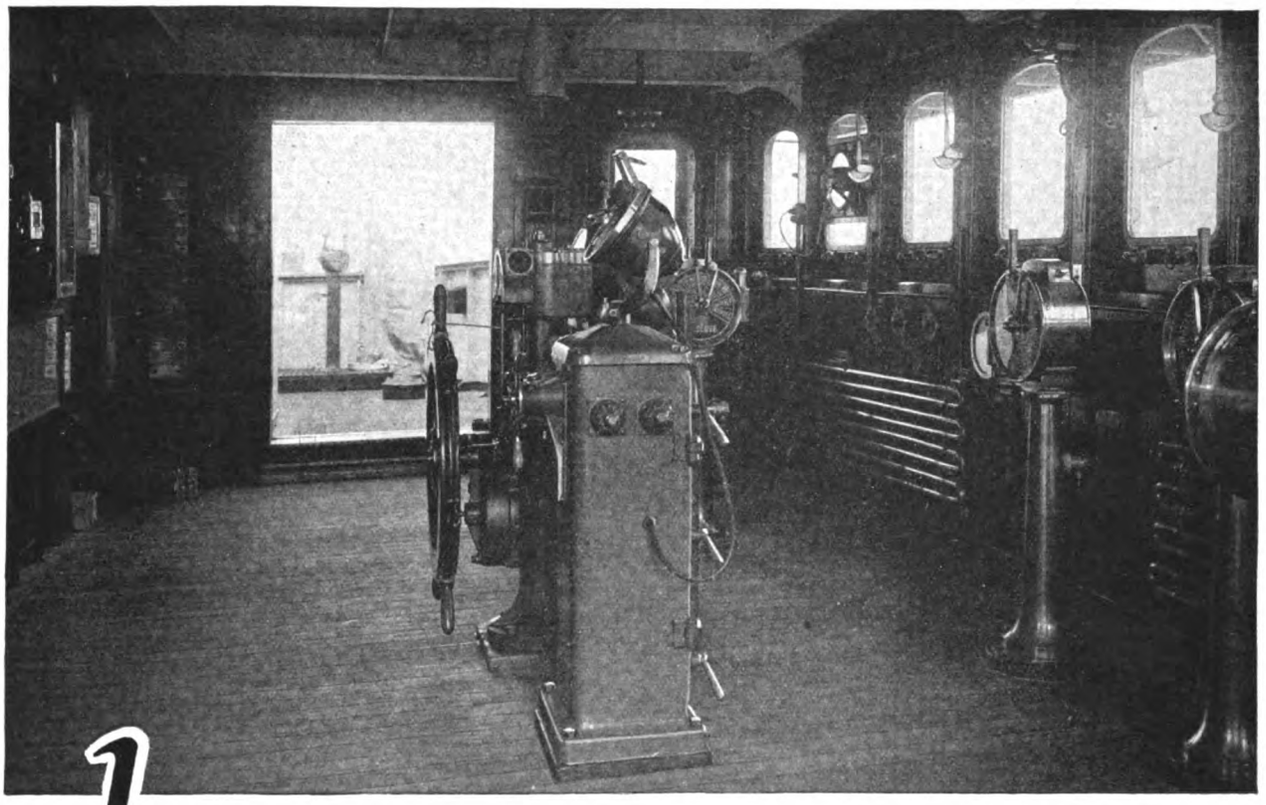

*The* MALOLO'S *bridge*

# Up to the Minute

THE designers and owners of the MALOLO know the importance of safety, accurate navigation and efficient steering. They, therefore, made sure that the Sperry Gyro-Compass, Gyro-Pilot, Helm Angle Indicator, Engine Speed Indicator and High Intensity Searchlight were made a part of this great ship's equipment.

SPERRY

## THE SPERRY GYROSCOPE COMPANY

LONDON BROOKLYN, NEW YORK TOKYO

CLEVELAND LOS ANGELES PHILADELPHIA SAN FRANCISCO SEATTLE



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*Gargoyle Marine Oils can be purchased here and in more than 300 of the other leading ports of the world.*

*PORT OF DURBAN*
*This map is one of a series. Watch for the succeeding ones.*

# How Correct Lubrication Improves Net Profits

A large proportion of world shipping approves Gargoyle Marine Oils.

Here are some of the savings that follow the use of these high grade lubricants. Each item affects net profits.

1. Savings through reduced maintenance costs.
2. Savings through prolonged life of the power plant . . due to decreased friction of working parts.
3. Savings through elimination of delays at sea due to hot or burned out bearings.
4. Savings through reduction of time lost in port for repairs.
5. Savings through increased speed, or reduced fuel consumption for the same speed through more efficient operation of propelling machinery
6. Savings through reduced oil consumption.

All of the above savings in greater or less degree are possible with the use of Gargoyle Marine Oils.

Let a Vacuum Oil Company representative recommend the specifically correct oil for your particular engine or engines. Standardize on Gargoyle Marine Oils for a year. Then check the results for yourself. Stocks carried in more than 300 world ports.

GARGOYLE

## Marine Oils

*A grade for each type of service*

Note: On request we will send free copy of our authoritative treatise: "Marine Lubrication." Write for your copy.

**Vacuum Oil Company** *Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.* ***New York, U. S. A.***



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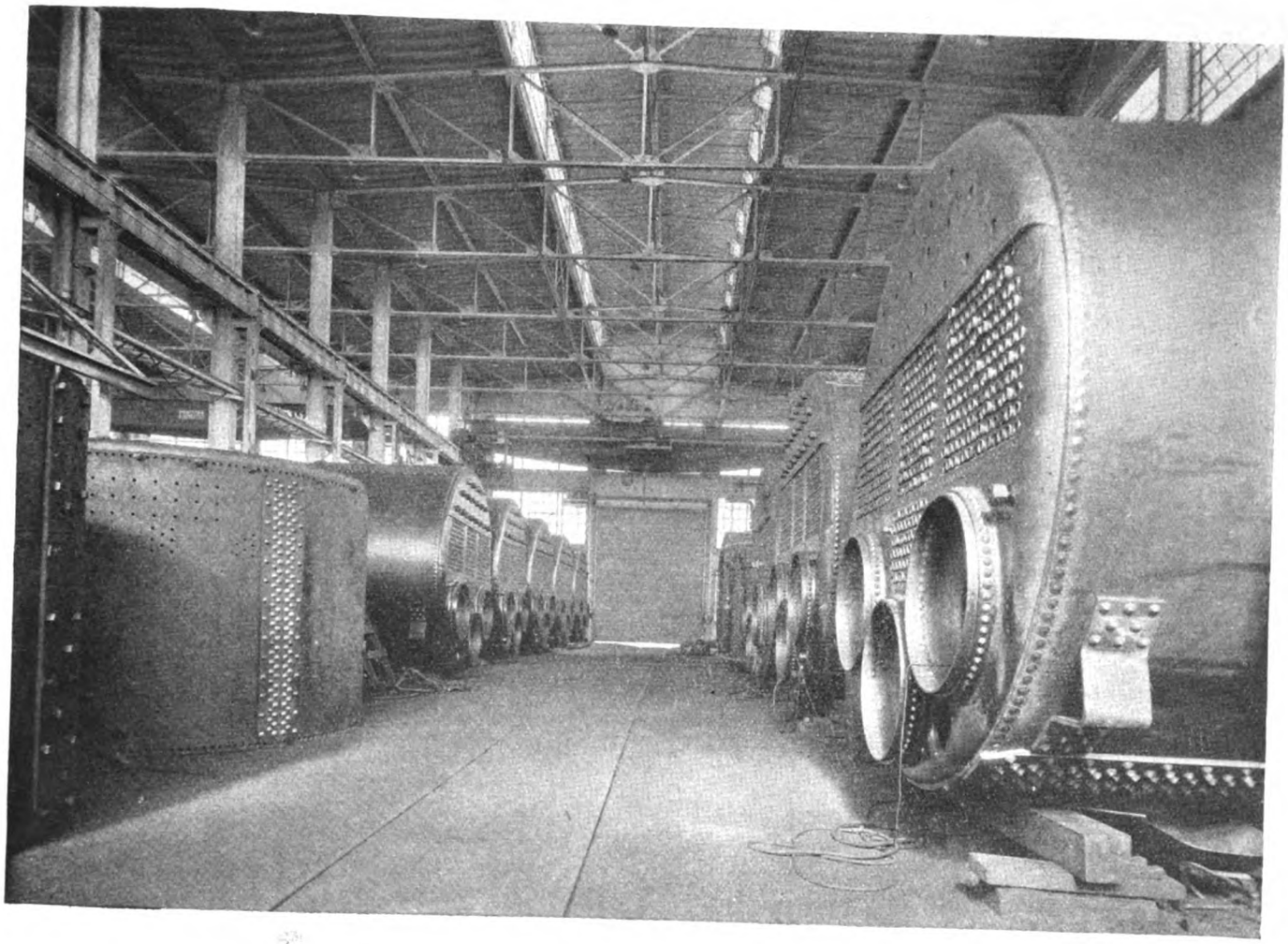

# Don't Trust Ancient Boilers

pensive loss of time during the operating season. So don't put off replacing old boilers till they are absolutely "gone." Do it now, in winter, while your ships are laid up.

Some of the big fleets realize the wisdom of this plan and are having new boilers installed by us now. Whatever your repair jobs may be—boilers, hulls or engines—you will find it a good policy to insist that they be done at our nearest shipyard.

We have everything required to build ships and repair any part of them well and *quickly*. Yards, dry docks—forge, foundry and machine shops—floating equipment and trained men—at seven strategic points as listed below.

# SHIP BUILDING Co

SOUTH CHICAGO
*Chicago Ship Building Co.*

SUPERIOR
*Superior Shipbuilding Co.*

MILWAUKEE
*Milwaukee Dry Dock Company*



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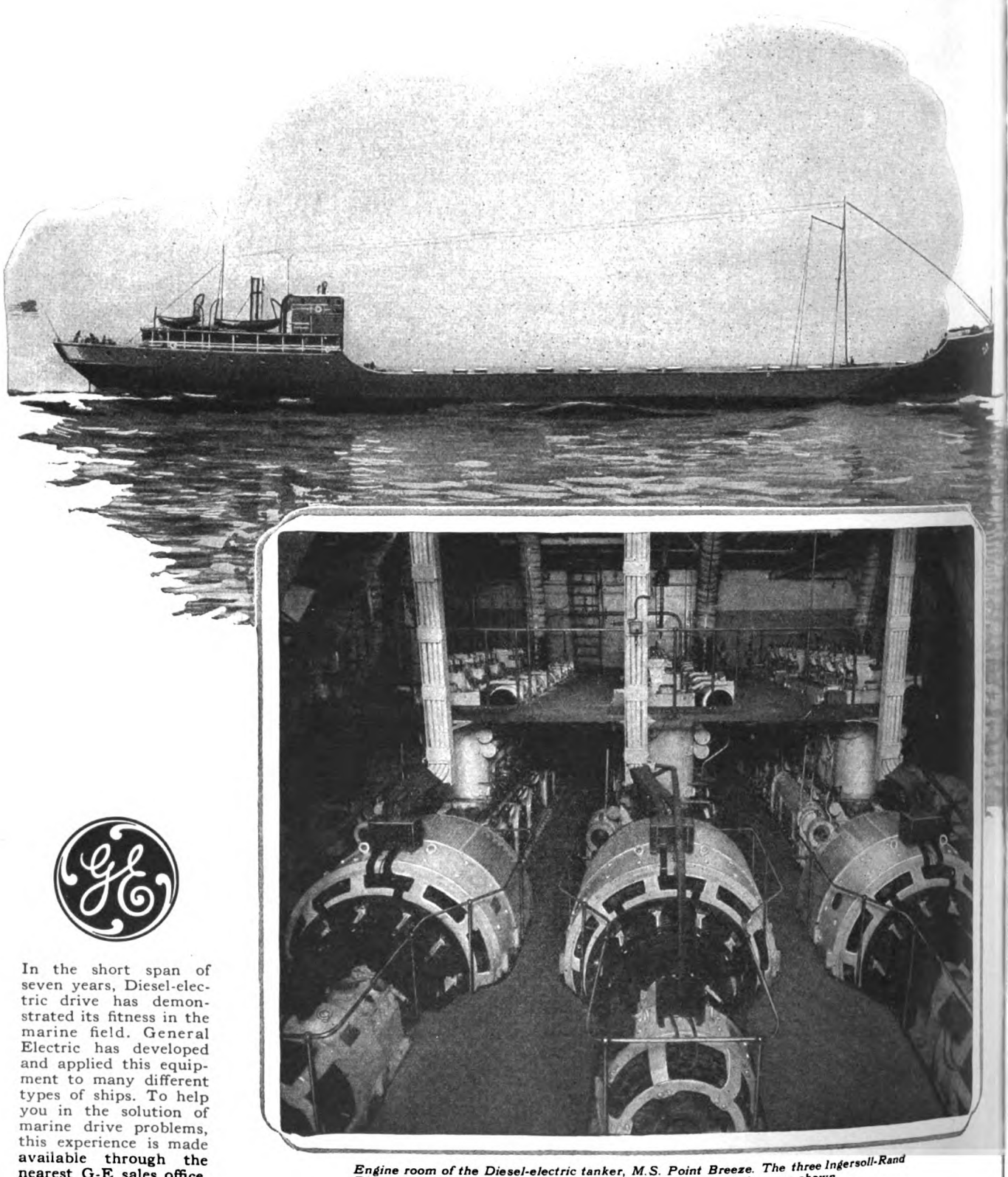
# Another service in which



In the short span of seven years, Diesel-electric drive has demonstrated its fitness in the marine field. General Electric has developed and applied this equipment to many different types of ships. To help you in the solution of marine drive problems, this experience is made available through the nearest G-E sales office.

*Engine room of the Diesel-electric tanker, M.S. Point Breeze. The three Ingersoll-Rand Diesel engines, the main generators, and the auxiliary generators are shown.*

# GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK



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# Diesel-electric drive excels

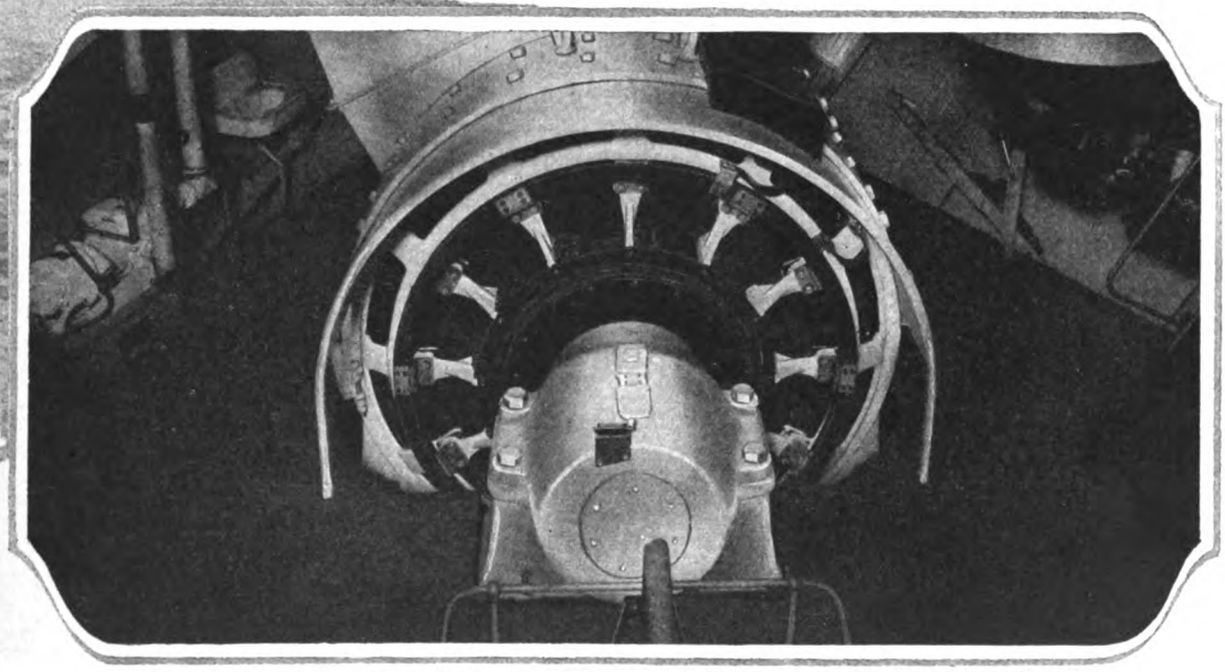
## The Atlantic Refining Company's Tankers *Point Breeze, Sharon,* and *Bessemer*

The experience of the Atlantic Refining Company with Diesel-electric drive made inevitable its selection of this superior form of ship propulsion for the new tankers, ***Point Breeze, Sharon,*** and ***Bessemer.*** As a matter of course, it also chose General Electric equipment.

Owners and operators of Diesel-electric vessels invariably select this type of drive for new ships, for they are convinced of its superiority. An outstanding advantage of this form of propulsion is its maneuvering ability.

The compactness of the Diesel engines and the generators permits a reduction in the amount of space, and especially in the headroom, ordinarily required for the propulsion equipment. As the motor can be located at the stern of the ship, a long propeller shaft and shaft tunnel, with all the attendant disadvantages, are unnecessary.

These and other advantages explain why G-E Diesel-electric equipment has been termed "the modern marine drive."



*Propulsion motor of the Diesel-electric tanker, M.S. Point Breeze. This motor is rated 1800 h.p. at 90 r.p.m.*

123-11

ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES



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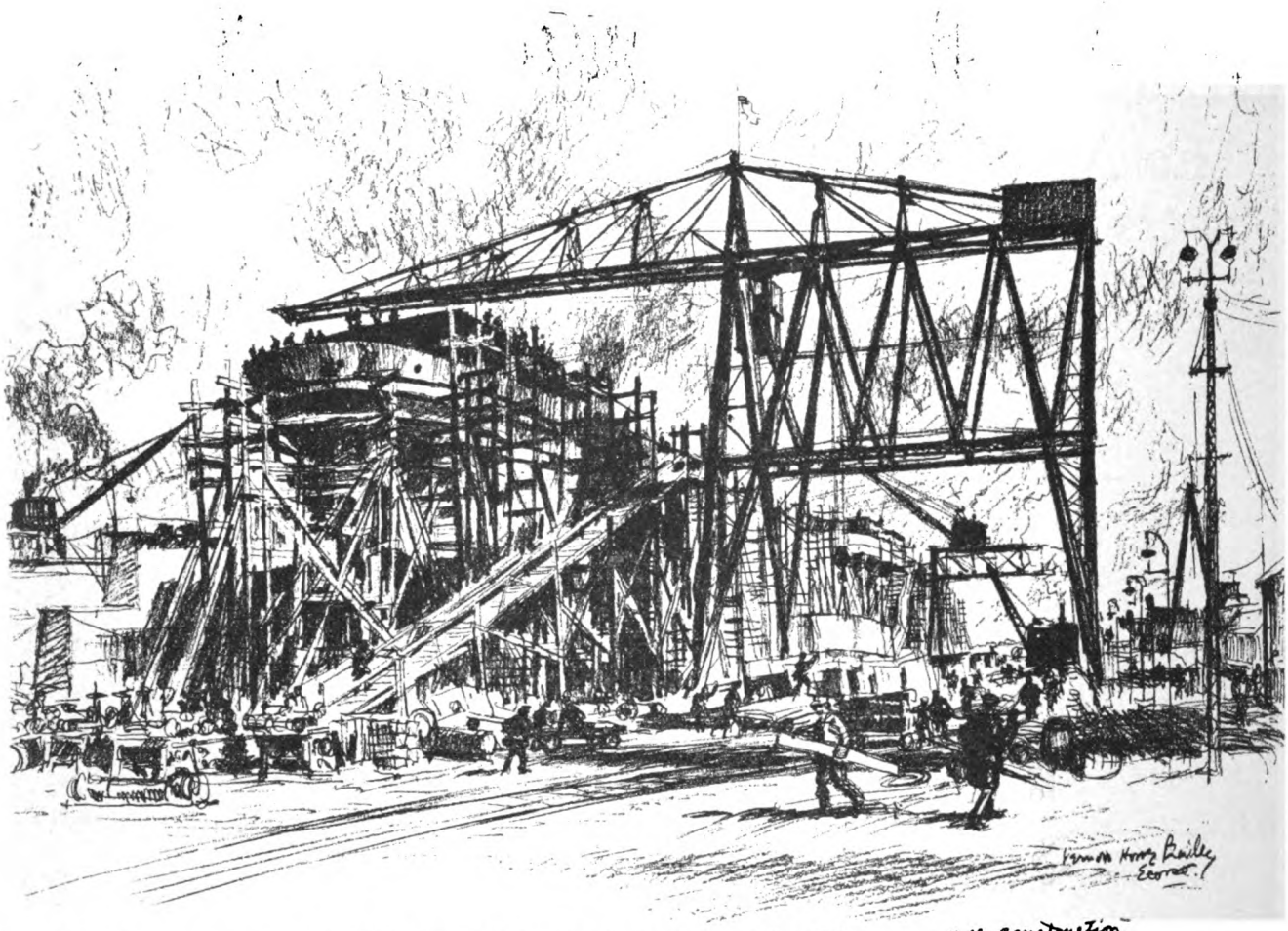


*Great Lakes Hull under construction at River Rouge Yard. From an original etching by Vernon Howe Bailey.*

# GREAT LAKES ENGINEERING WORKS

General Offices:

**RIVER ROUGE, MICHIGAN**

**CLEVELAND OFFICE—UNION TRUST BLDG.**

Shipyard,
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and Repair Plant
**RIVER ROUGE, MICH.**

Shipyard, Dry Dock,
Engine Building
and Repair Plant
**ASHTABULA, OHIO**

Engine and Repair Plant
**DETROIT, MICHIGAN**

# STEEL SHIP BUILDERS



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# WORLD-WIDE FREIGHT SERVICES *that help* YOUR EXPORT TRADE

THE fact that they sail under the American flag—reach ports in all parts of the world—carry their cargoes safely and promptly to their destinations—and are under the direction of experienced American operators whose advice has proven very helpful—has made the freight services operated for the United States Shipping Board an important factor in the expansion and enlargement of the export trade of progressive American shippers.

Specify American ships for your foreign trade—there are more than 300 of them comprising 26 lines and they sail from Atlantic Coast, Pacific Coast and Gulf Ports to ports in the United Kingdom, Irish Free State, Continental Europe, South America, the Orient, Dutch East Indies, Australasia, India and Africa—as a matter of fact, to all parts of the world.

**AMERICA FRANCE LINE**
*Cosmopolitan Shipping Co., Inc.*
42 Broadway, New York City
North Atlantic to French ports

**AMER. AUS. ORIENT LINE**
*Swayne & Hoyt, Inc.*
430 Sansome St., San Francisco, Cal.
Pacific Coast to Australia, New Zealand, Straits Settlements

**AMERICAN DIAMOND LINES**
*Black Diamond S. S. Corp.*
67 Exchange Place, New York City
North Atlantic ports to Rotterdam, Holland, and Antwerp, Belgium

**DIXIE UK LINE**
*Dixie Steamship Co.*
Whitney Central Bank Bldg.
New Orleans, La.
New Orleans to United Kingdom and Irish Ports

**DIXIE MEDIT. LINE**
*Dixie Steamship Co.*
Whitney Central Bank Bldg.
New Orleans, La.
New Orleans to Mediterranean ports

**AMER. WEST AFRICAN LINE**
*A. H. Bull & Co., Inc.*
40 West Street, New York City
North Atlantic and Gulf ports to west coast of Africa, including Azores, Canary, and Madeira Islands

**AMER. MERCHANT LINES**
*J. H. Winchester & Co., Inc.*
17 Battery Place, New York City
Passenger and freight services to United Kingdom ports

**AMERICAN INDIA LINE**
*Roosevelt S. S. Co., Inc.*
16 Beaver Street, New York City
North Atlantic ports to Indian ports

**ATL. AUSTRALIAN LINE**
*Roosevelt S. S. Co., Inc.*
16 Beaver Street, New York City
New York to Australian ports

***Periodically the above two lines combine on an around the world service via the Suez Canal.***

**GULF BRAZIL RIVER PLATE LINE**
*Mississippi Shipping Co., Inc.*
Hibernia Bank Bldg.
New Orleans, La.
Gulf ports to Brazil and River Plate ports, east coast of South America

**GULF WEST MEDITERRANEAN LINE**
*Tampa Interocean S. S. Co.*
919 Whitney Building,
New Orleans, La.
Gulf and South Atlantic ports to Portuguese, Spanish, and North African ports (west of Bizerta)

**MISSISSIPPI VALLEY EUROPEAN LINE**
*Mississippi Shipping Co., Inc.*
Hibernia Bank Building
New Orleans, La.
New Orleans to French Atlantic and Belgian ports

**MOBILE OCEANIC LINE**
*Waterman S. S. Corp.*
Mobile, Ala.
Mobile and Eastern Gulf ports to United Kingdom and continental European ports

**AM. ORIENTAL MAIL LINE**
*Admiral Oriental Line*
1519 Railroad Ave., South
Seattle, Wash.
Puget S. ports on Pacific to Orient

**AMERICAN PALMETTO LINE**
*South Atlantic Steamship Line*
Bay Street, East, Savannah, Ga.
South Atlantic to United Kingdom and continental European ports

**AMERICAN PIONEER LINE**

**(Atlantic Division)**
*Roosevelt S. S. Co.*
16 Beaver St., New York City
N. Atl. ports to Orient and Dutch E. I.

**(Gulf Division)**
*Tampa Interocean S. S. Co.*
Whitney Bldg., New Orleans, La.
Gulf ports to Orient and Dutch E. I.

**YANKEE LINE**
*Rogers & Webb*
110 State Street, Boston, Mass.
North Atlantic to German ports

***Passenger Services. Included in these services are the speedy passenger vessels of the United States Lines sailing from New York to principal European ports, also the American Merchant Lines ships which sail weekly between New York and London carrying a limited number of passengers at remarkably reasonable rates.***

***For complete information on either freight or passenger services as to rates, ships, dates of sailing, etc., write to***

**AMERICAN REPUBLICS LINE**
*C. H. Sprague & Son, Inc.*
33 Broad St., Boston, Mass.
North and South Atlantic ports to Brazil and River Plate ports, east coast of South America

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*Texas Oceanic S. S. Co., Inc.*
Cotton Exchange Bldg.
Galveston, Tex.
Texas to United Kingdom ports

**OREGON ORIENTAL LINE**
*Columbia Pacific Shipping Co., Inc.*
Porter Building, Portland, Ore.
Columbia River ports on Pacific Coast to Orient

**ORIOLE LINES**
*Consolidated Navigation Co.*
Citizens National Bank Building
Baltimore, Md.
North Atlantic ports to west coast of United Kingdom and Irish ports

**SOUTHERN STATES LINE**
*Lykes Bros.-Ripley S. S. Co., Inc.*
925 Whitney Central Building
New Orleans, La.
New Orleans and Texas ports to German and Holland ports

**TEXAS MEDIT. LINE**
*Texas Oceanic S. S. Co., Inc.*
Cotton Exchange Bldg.
Galveston, Tex.
Texas to Mediterranean ports

**TEXAS STAR LINE**
*Lykes Bros.-Ripley S. S. Co., Inc.*
925 Whitney Central Building
New Orleans, La.
Texas to French and Belgian ports

**UNITED STATES LINES**
45 Broadway, New York City
Passenger, mail, freight services to England, Ireland, France and Germany

## UNITED STATES SHIPPING BOARD

*Merchant Fleet Corporation*

**WASHINGTON, D. C.**



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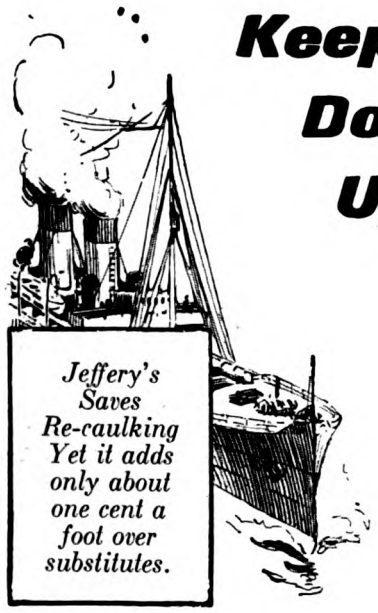


**Keep Down Upkeep**

*Jeffery's Saves Re-caulking Yet it adds only about one cent a foot over substitutes.*

# JEFFERY'S MARINE GLUE

Pitch, putty, and other substitutes for Jeffery's Marine Glue, *cost you more!* You have to re-caulk oftener, and tinker constantly with decks to keep them tight.

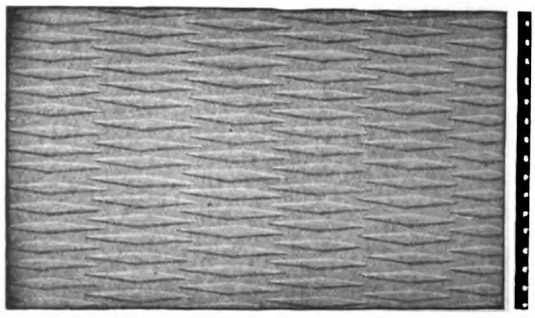
If you're responsible for purchasing materials, or for the upkeep of vessels, investigate Jeffery's Marine Glue. It goes farther — pound for pound; saves re-caulkings; and "stays put" in hot or cold weather without becoming sticky or crumbling out. It keeps down upkeep!

**JEFFERY'S**
***No. 2***
***First Quality***
**MARINE SHIP GLUE**

*Write for Literature*

**L.W. Ferdinand & Co.**
*152 Kneeland Street, Boston, Mass.*

# Rolled Steel "Neverslip" Floor Plates



**Raised Diamond**
Diamond and Ribbed Pattern

# American Pressed Steel Co.

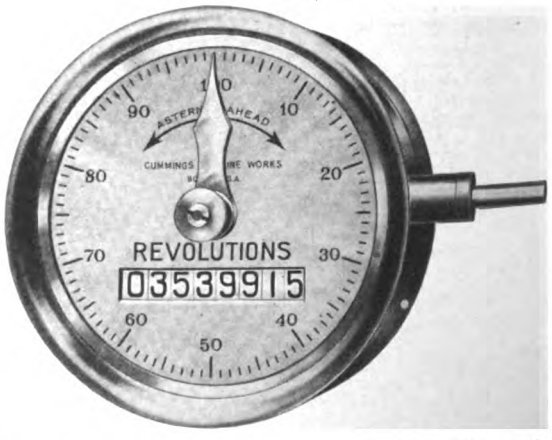
Philadelphia, Pa.

***The original diamond pattern floor plate.***

# Cummings

## Combination Counter & Telltale

Officially approved as conforming to
**Emergency Fleet Technical Order No. 104**
IMMEDIATE DELIVERIES




Continuous Rotary eight figure large numeral counter with no troublesome reciprocating parts.
Countershaft geared down 1 to 10 of main shaft.
Positive counter with adjustable friction-drive telltale, 9-inch dial.
Same hardened steel counter as used by U. S. navy on all destroyers, battleships, etc.
To determine R.P.M. hold watch in one hand and telltale on zero with other hand, release and stop after interval of 60 seconds.
We also furnish driving mechanism from main shaft to counter.

**Cummings Machine Works**
**255 Atlantic Ave.** BOSTON, U. S. A.

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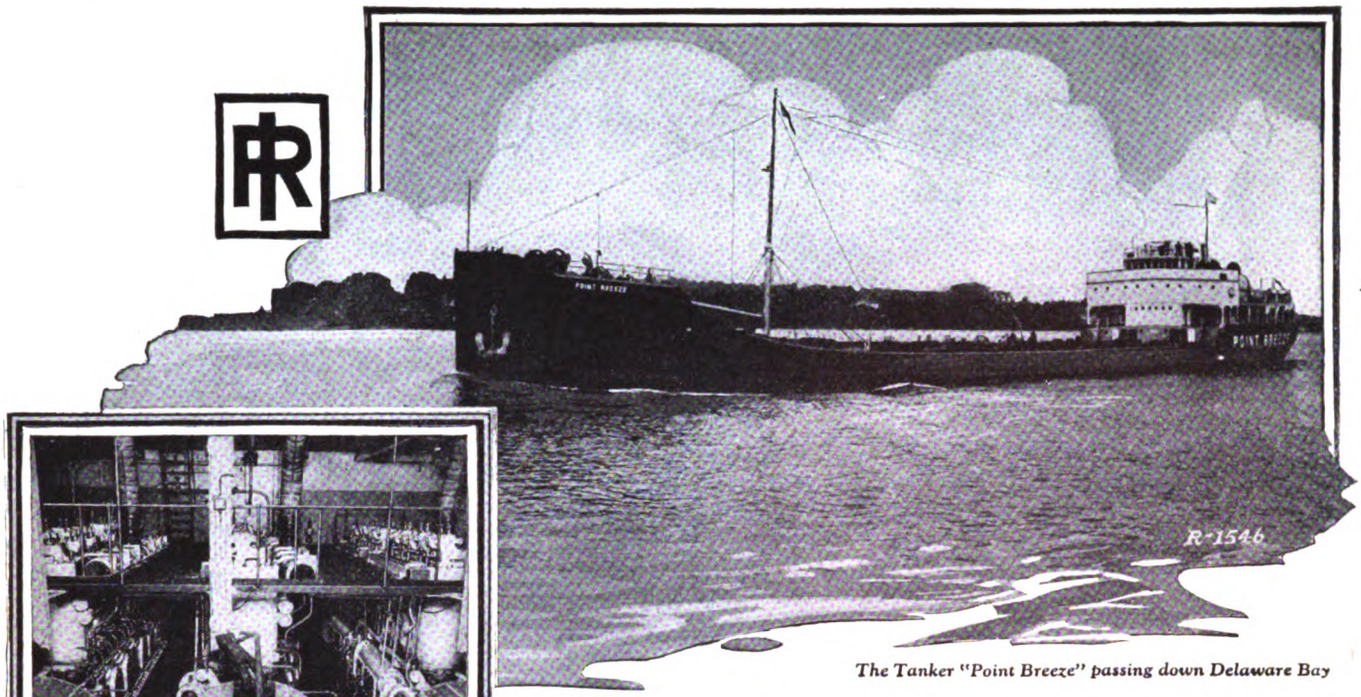
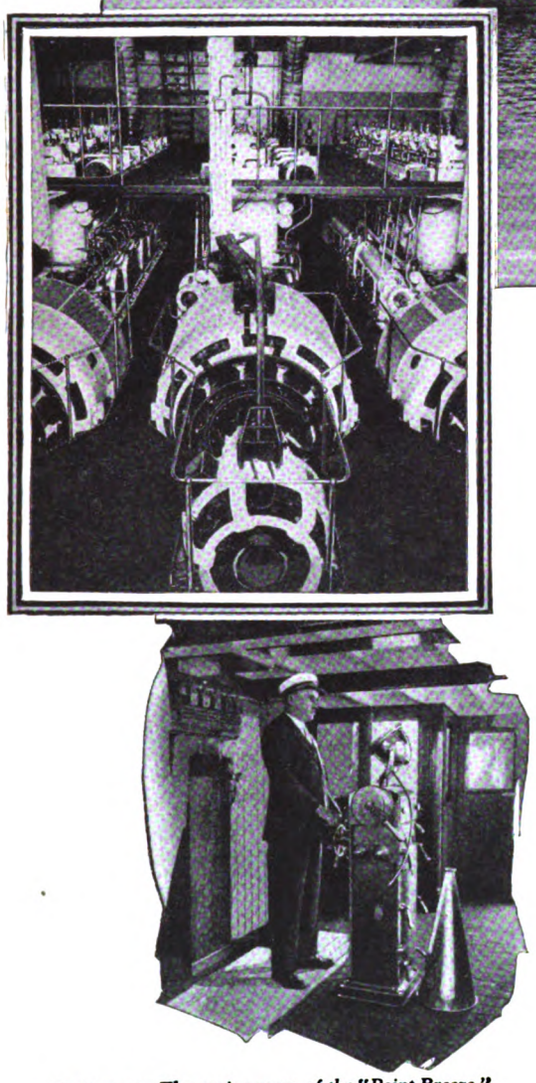



The Tanker "Point Breeze" passing down Delaware Bay



UPPER VIEW—*The engine room of the "Point Breeze."*
LOWER VIEW—*The pilot house of the "Point Breeze." Note simplicity of control.*

# *Atlantic Refining Company adds New Diesel-Electric Tanker*

THE TANKER *"Point Breeze"* is the latest conversion to Diesel-electric drive by the Atlantic Refining Company. This concern now has a fleet of six boats equipped with Ingersoll-Rand Marine Engines. Of the six vessels, three are tugs and three tankers.

The *"Point Breeze"* is a converted steamship. It was formerly the "J. M. Connelly," a U.S. Shipping Board vessel. Installed on this boat are three main generator sets, each driven by an Ingersoll-Rand Type PR Oil Engine of 650 b.hp. A single propulsion motor drives the propeller.

Diesel-electric drive with I-R Marine Engines insures reserve power and high fuel economy. It practically eliminates the danger of complete shut-down at sea, and makes possible complete control from the pilot house.

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*Offices in principal cities the world over*
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61 MOE

# Ingersoll-Rand



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# RCA
# MARINE RADIO

## Standard Equipment on many large fleets

Many progressive steamship companies operating large fleets have installed RCA Marine Radio on their vessels.

### *RCA radio service includes:*

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RCA coastal stations handle maritime radio traffic promptly and accurately.

The RCA Radio Direction Finder is the greatest aid to navigation developed in modern times. Built on the super-heterodyne principle, enclosed loop. All units enclosed in one cabinet. Durable and compact—simple and reliable in operation.

RADIO CORPORATION OF AMERICA

*Marine Department*

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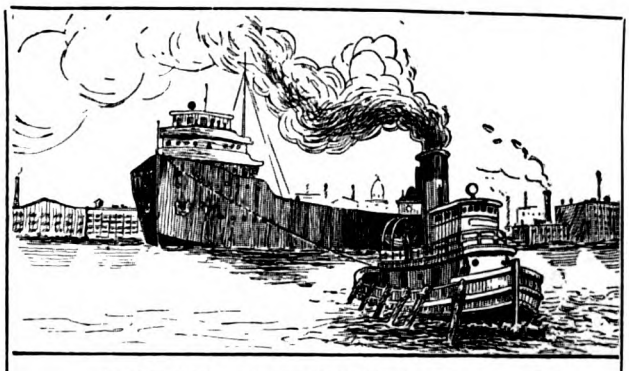
# RCA
# MARINE RADIO





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With a feeling of satisfaction when the vessel is furnished with Supplies that you can depend on.

That is the kind we have been delivering to the boats on the great lakes for over 80 years.

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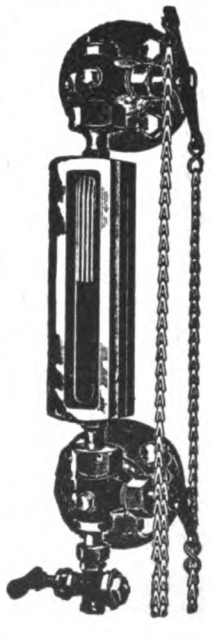

## Engineering Specialties

### REFLEX WATER GAGES

Used on all types of boilers by all the Principal Navies of the World

### "THE WATER SHOWS BLACK"

ADVANTAGES

Quick and reliable observation of the water level. Safe, sure and durable at high pressures. Not affected by cold air drafts. Most effective protection against injuries to boilers and workmen. Easily applied to all types of gage glass fittings.

When filled with WATER the Reflex Gage always appears BLACK. When empty it instantly shows WHITE. No mistake possible. This feature alone is worth many times the cost of the Reflex.

Send for catalog of Water Gage Apparatus.

MANUFACTURED BY THE

**JERGUSON GAGE & VALVE CO.**

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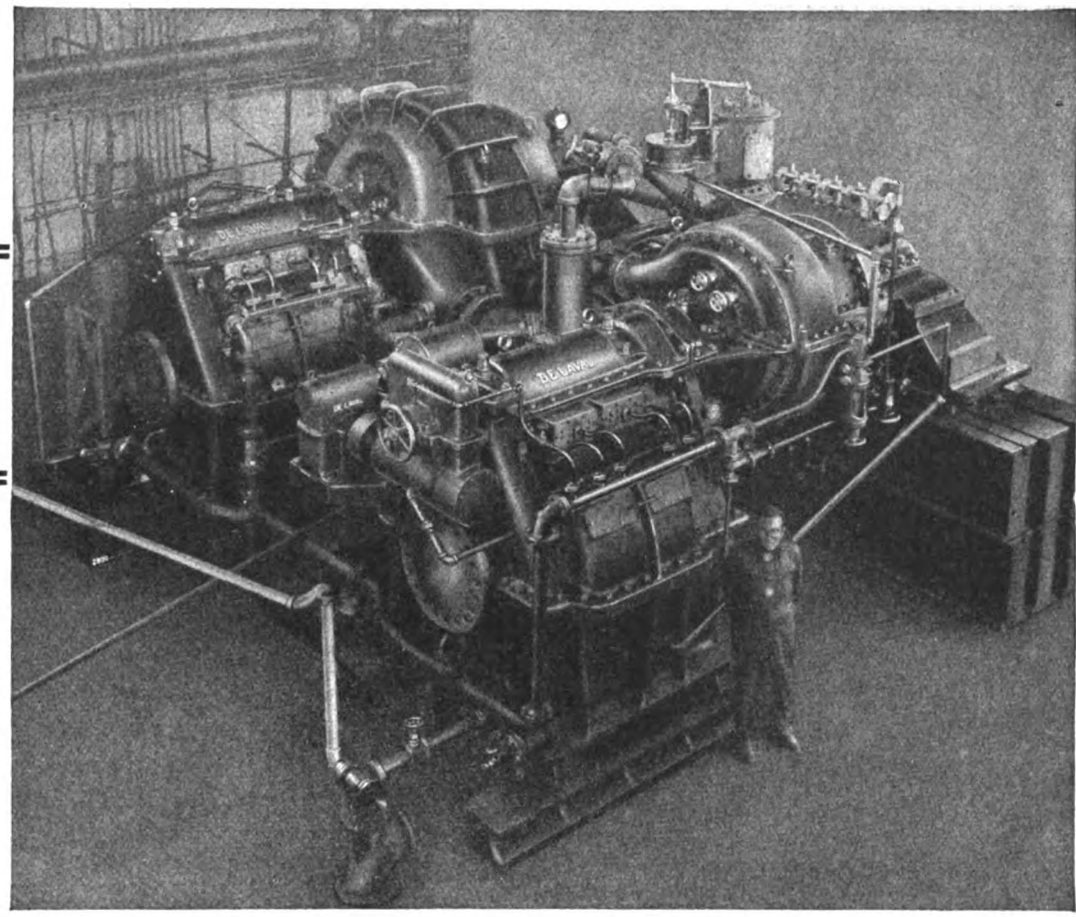

# A Remarkable Advance In Marine Engineering

BECAUSE of the high steam pressure and superheat, the high vacuum to be provided and the efficient type of turbine and gears used, it is expected that the fuel consumption of the new freight and passenger vessel "Dixie" of the Southern Pacific Line will be exceedingly low.

The De Laval Compound Turbine will operate on steam at 350 lbs. per sq. in. gage at the throttle, and 140° F. superheat, and is rated at 7100 H.P. normal, with an overload capacity of 10%. The propeller is driven at 90 RPM. through De Laval Double Reduction Gears. The accompanying photograph shows the high and low pressure turbines and the high speed gears only, the low speed gears being erected separately.

The turning gear consists of an electric motor and a double De Laval worm Reduction gear, the worm wheel of the second gear being arranged for connection to the high pressure turbine pinion. This arrangement replaces the usual large and cumbersome turning gear attached to the propeller shaft.

The "Dixie" was built by the Federal Ship Building and Dry Dock Co. and is the third Southern Pacific vessel to be equipped with De Laval Gears, the other two being the "El Coston" (ex "Bienville") and "El Oceano", both of which have given remarkably successful and satisfactory results in service.

Estimates and guarantees regarding De Laval Propelling Equipment will be supplied upon receipt of specifications.

## De Laval Steam Turbine Co.

**Trenton, New Jersey**

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**Manufacturers of Steam Turbines, Centrifugal Pumps, Centrifugal Blowers and Compressors, Double Helical Speed Reducing Gears, Worm Gears, Hydraulic Turbines, Flexible Couplings and Special Centrifugal Machinery** 685



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# WATERFLEX
VERSUS
# ORDINARY

(1)

**←Ordinary Rope—Wet**

The adjoining photographic reproduction (1) illustrates a difficulty that is familiar to thousands of rope users. A tackle or block and fall, made with ordinary Manila rope, and allowed to become wet, is an extremely difficult thing to manage. The twisting, kinking and swelling of such cordage cause much waste of time and create a safety hazard. Much unnecessary expense can be saved by avoiding old-fashioned rope for tackle use.

(2)

**Waterflex Rope—"Wet"→**

Tackle (2) was made up exactly similar to (1), with rope of the same size and lay,—but of Waterflex construction. Both "falls" were exposed to rain the same length of time and under the same conditions. The comparative result speaks for itself.

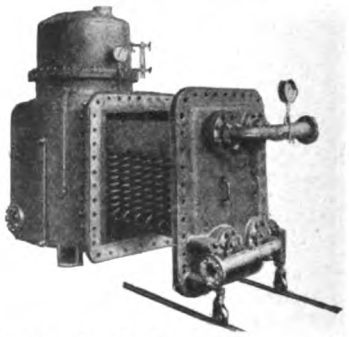
Experienced rope users naturally marvel at such an accomplishment, and many of them have become enthusiastic users of Waterflex at large annual savings in their rope costs.

**WHITLOCK CORDAGE COMPANY**
46 South Street, New York

*Factory and Warehouses*
Jersey City, N. J.

*Branches*
Chicago, Boston, Kansas City *and* Houston

# The Evaporator that frees itself from scale



**Bulletin 330 explains why**
**Send for copy**

**THE GRISCOM-RUSSELL CO.**
285 Madison Ave., New York
Chicago Office: Monadnock Block
*Branch offices in principal ports*

# THERMIT

Repairs to broken stern frames, rudder frames, shafts and other heavy or medium sections can be made quickly and permanently.

Thermit welding will not only save time but also the money involved in the replacement of expensive parts, while the strength and durability of the member will be greater than before—a permanent repair.

Send for pamphlet No. 3440. If in a hurry, wire or telephone our nearest plant.

*Approved by Lloyds and the Principal Marine Rating Bureaus*

# WELDING

**METAL & THERMIT CORPORATION**
120 BROADWAY, NEW YORK, N.Y.
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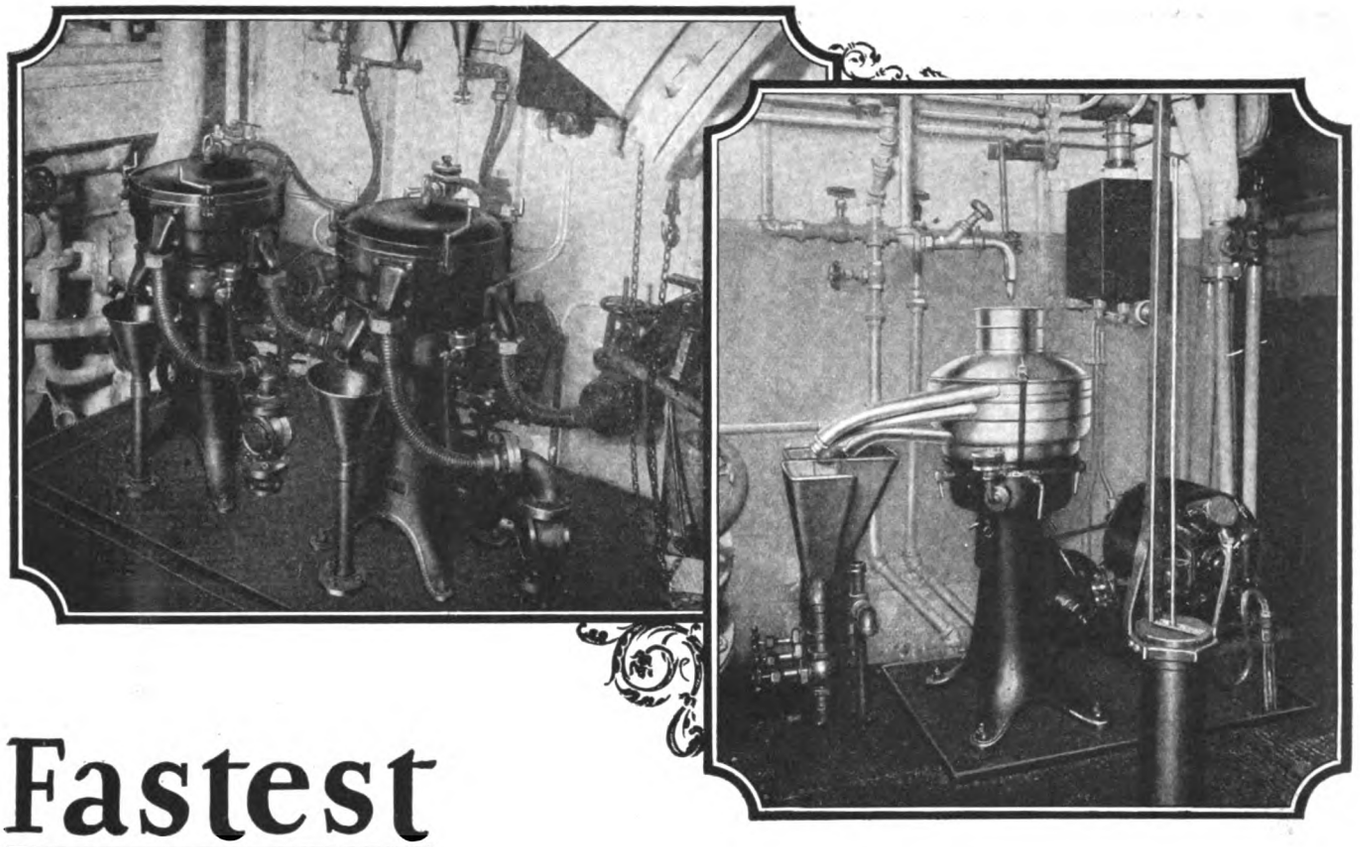

# Fastest

## Shipping Board Conversion
## *Equipped with* DeLaval Oil Purifiers

Three De Laval Oil Purifiers — two of vapor-tight construction for fuel oil — protect the 3680-b.hp. Hoovens, Owens, Rentschler double-acting Diesel engine on the latest and fastest Shipping Board conversion, M. S. Seminole. The Purifiers exclude abrasive dirt from the cylinders and bearings — keep the oil dry — remove carbon and sludge from the lubricating system.

Shipping Board engineers know that clean lubricating and fuel oil reduce engine wear, improve operating efficiency, lower repair costs, lengthen engine life. They have learned, too, that centrifugal purification is positive and unfailing at sea or in port — that it removes finely divided impurities and moisture as well as heavy solids, thereby keeping the oil in perfect condition *always* and eliminating waste.

Hence centrifugal machines were specified for all the twelve Shipping Board Diesel conversions now completed or under way.

Bulletin 106-MR tells about the latest practice in purifying either lubricating or fuel oil. Write for a copy today, outlining your own problem.

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 600 Jackson Blvd., Chicago
DE LAVAL PACIFIC COMPANY, San Francisco
ALFA-LAVAL CO., Ltd., 34 Grosvenor Road, London, S. W. I.

# De Laval Oil Purifiers
## *Types for Lubricating Oil and Fuel Oil*



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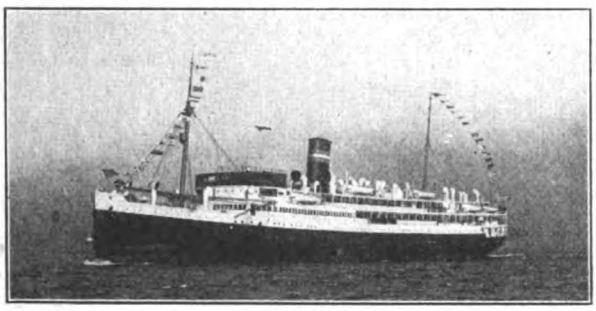
# Independent Service
and the
# Great AGWI Fleet

Practically every ship of the great AGWI fleet, which includes the Ward Line, Porto Rico Line, Clyde Line, Clyde Santo Domingo and Mallory Line, is furnished with

## INDEPENDENT RADIO SERVICE



*Steamship Coamo, flagship of the fleet of the Porto Rico Line*

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*Dependability*
in an
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# DEAN BROS.
## MARINE PUMPS
*"The Dean of Pumps on Land and Sea"*

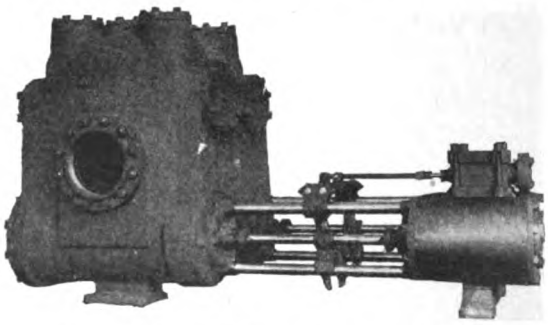

Figure No. 1518 Horizontal Durable Duplex Piston Type Pump for Ballast and General Light Service.

ESTABLISHED 1869
DEAN BROS. COMPANY
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# NATIONAL Diesel Engine Forgings

We manufacture High Grade Carbon and Alloy Steel Forgings, furnished smooth forged, rough turned, heat treated and finished complete; specializing in Diesel Engine Forgings, Hollow Bored Forgings, rough or finished bored, and Ordnance Work.

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Anti-noise and Standard Telephone Systems for Ships Service, Navigation Control, General Announcing, and Interior Communication
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J. S. Jones, Vice President
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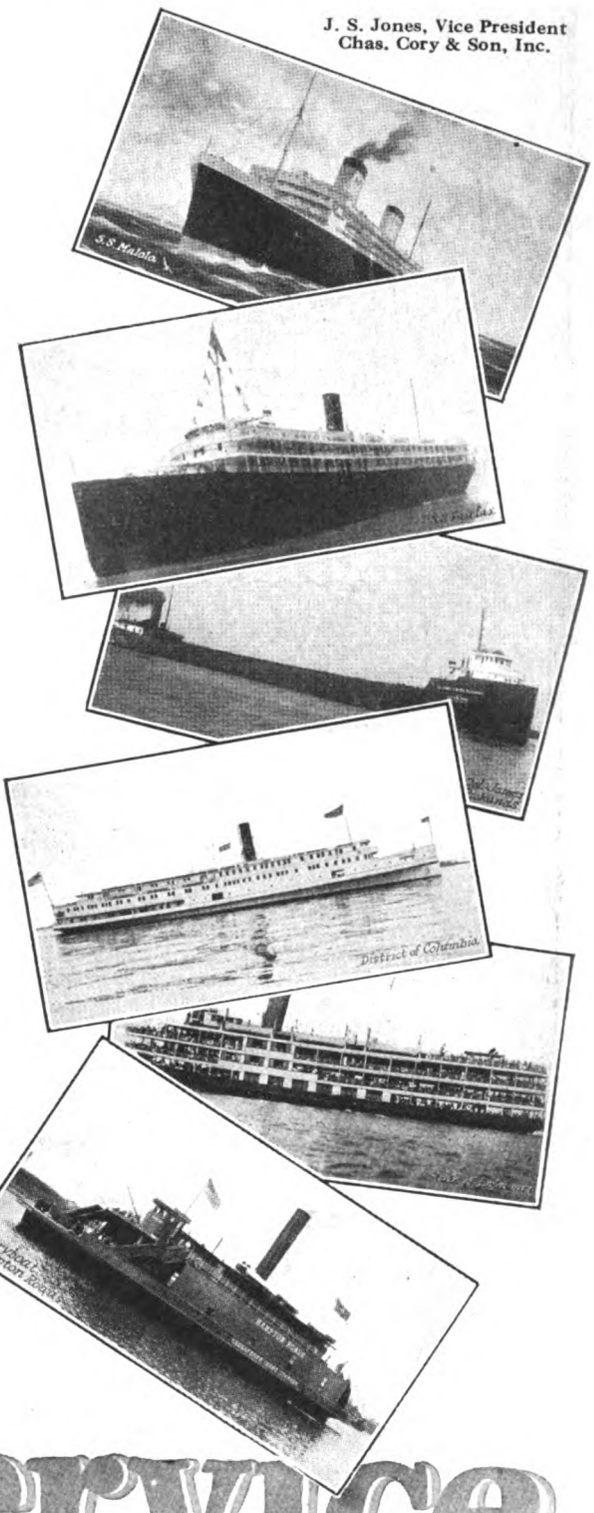


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ROWLAND PROCESS FORGE WELDED
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# Morison
## Suspension Furnaces
***For Scotch Marine Boilers***

Made to United States, American Bureau of Shipping, Lloyd's, Bureau Veritas, or any other requirements.

These are the old reliable Suspension Furnaces formerly built by the Continental Iron Works (established 1859). They are made by the same process and with the same equipment, which was purchased from Continental when that concern retired. The old policy of supreme quality is being maintained, and deliveries can be made very promptly.

A useful folder, giving working pressures for various sizes of furnaces, will be mailed on request.

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Telephone, Cortlandt 8110
**Works: Carbondale, Pennsylvania**

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DROP FORGED WELDLESS
# EYE BOLTS
ROLLED THREAD
GALVANIZED OR PLAIN

| | | | | | |
|---|---|---|---|---|---|
| ½" | DIAM. WITH | EYE | | ⅞" | INSIDE |
| ⅝" | " | " | " | ⅞" | " |
| ¾" | " | " | " | 1⅜" | " |
| 1" | " | " | " | 1½" | " |

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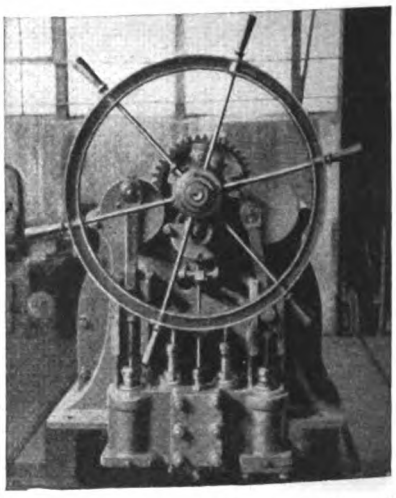

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Combines steam or hand steering in a single compact unit. Can be instantly changed from steam to hand power without removing hands from wheel. Built in two sizes and meets with universal approval due to simplicity and ease of operation.

Designers and builders of ships, tugs, scows, barges and marine auxiliaries.

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Manitowoc, Wis.

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Upon the sailing of the S. S. Mercer, with powdered coal fired boilers driving her to new fuel economy records, the fact stands forth that:

**IT REMAINED FOR PEABODY ENGINEERING EXPERIENCE TO CREATE**

**PEABODY**

**POWDERED COAL BURNERS**

to make the firing of that low cost fuel a practical Success in Scotch Marine Boilers.

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BUILDERS OF

# STEEL BARGES

for RIVERS and HARBORS

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**NEW YORK CENTRAL ORDERS 21st ELLIS BARGE**

Barges built under the Ellis Channel System of Steel Hull Construction have proved so satisfactory that one user, the New York Central Railroad, has ordered its 21st Ellis Barge. This is a Pile Driver Barge to be built by Atlantic Works, Boston. Write for further information on this seaworthy and economical type of construction.

**ELLIS CHANNEL SYSTEM**
**OF STEEL HULL CONSTRUCTION**

*Patented* *Edgar Ames, Sole Licensee*
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Especially adapted for
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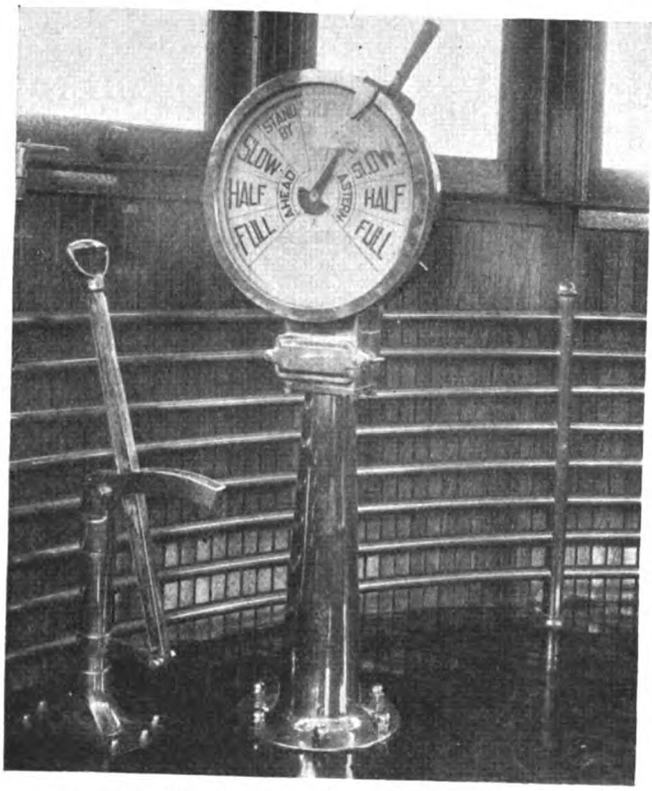
# Electrical Engine Room Telegraph and Rudder Angle Indicator of the TELINDICATOR Type




## Combined Transmitter And Receiver On Bridge S. S. Harry Coulby

The s. s. "Harry Coulby", Flagship of Pickands, Mather Steamship Co., is equipped with an Engine Room Telegraph of the Telindicator type. The above illustration shows the combined Transmitter and Receiver mounted on the bridge of the "Harry Coulby". Both Transmitter and Engine Room Receiver are enclosed in watertight, dust-proof, polished brass casings, mounted on polished brass columns. The Transmitter is fitted with interior illumination under opalescent glass.

Orders from the bridge are instantly recorded on the Engine Room Receiver. A bell continues ringing until the order has been acknowledged correctly, at which time the pointers and the handles on both instruments are in identical positions. Interruption of current is indicated on the dial of both instruments by a red mark appearing in the slot, which will be noticed on the dial, and a secondary pointer indicates the location of the interruption.

The underlying principle of Telindicator Instruments assures simplicity and reliability. Twenty-one years of actual use in service have rendered our instruments as accurate and fool-proof as it is humanly possible to make them.

Telindicator Telegraphs, and Rudder Angle Indicators—
Require fewer connecting wires than any other system;
Record break in line and interruption of current;
Are not affected by voltage fluctuations;
Cannot register incorrect readings.

*All Telindicators are Now Made in The United States and Delivered Under Guarantee.*

**OTHER PRODUCTS OF THE CORPORATION ARE—**

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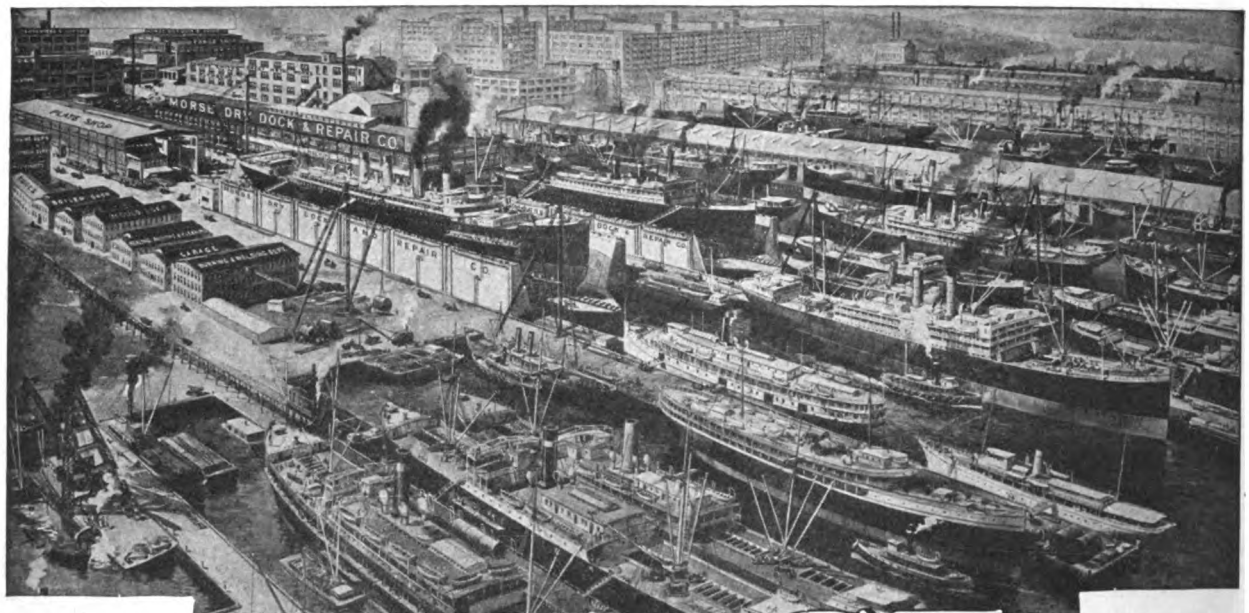

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Carpenter and Joiner Work
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PROPELLER WHEELS and PROPELLER BLADES to fit any hub.

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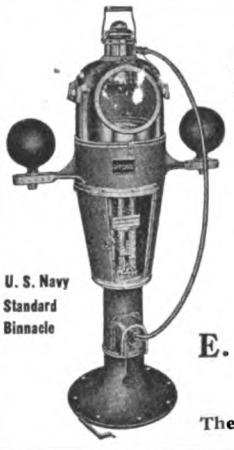

U. S. Navy Standard Binnacle

# THE RITCHIE LIQUID COMPASS

The Standard Liquid Compass the world over.
Used Exclusively in U. S. Navy for over 40 years.
Over 65,000 on Merchant Vessels in all parts of the world.
Made in all sizes 2 to 12" dia.
Magnets for adjusting Purposes.

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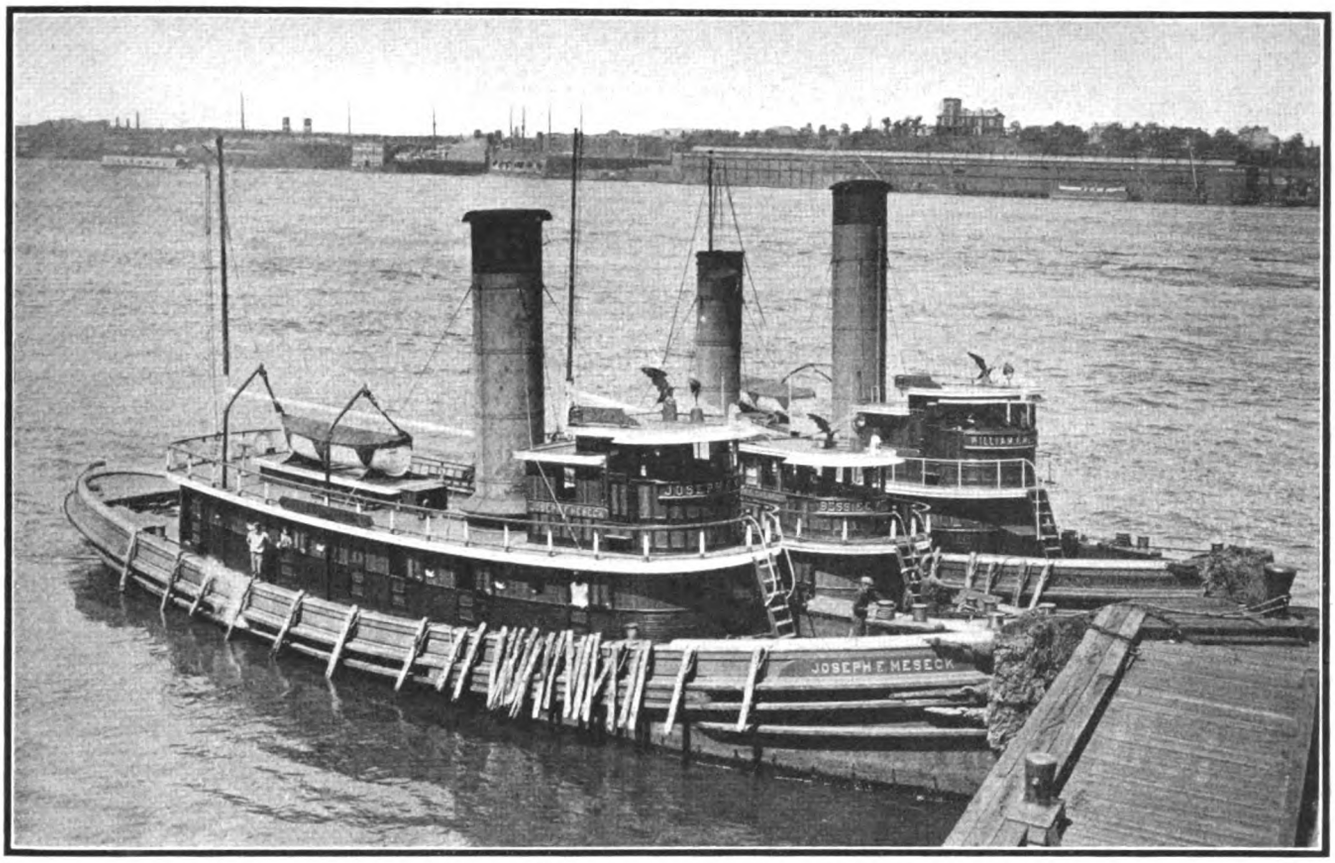
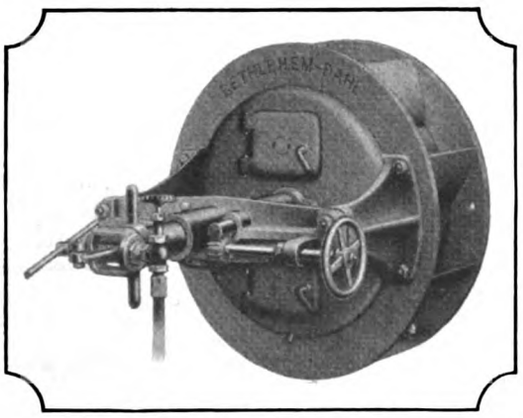



*The Joseph F., Bessie C., and William F. Meseck of the Meseck Towing Line. Each of these tugs and also the Mary E. and the John A. is equipped with a Bethlehem (Dahl) Mechanical Oil Burning System.*

# Bethlehem (Dahl) Mechanical Oil Burning Systems




Their economy of operation, ease and simplicity of handling, and dependability, assure the utmost in service and efficiency to purchasers of Bethlehem (Dahl) Mechanical Oil Burning Systems.

Having the vast resources of the entire Bethlehem organization upon which to draw, the Bethlehem (Dahl) Mechanical Oil Burning System exemplifies the high qualities of Bethlehem Products.

**BETHLEHEM SHIPBUILDING CORPORATION, LTD., BETHLEHEM, PA.**

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# BETHLEHEM



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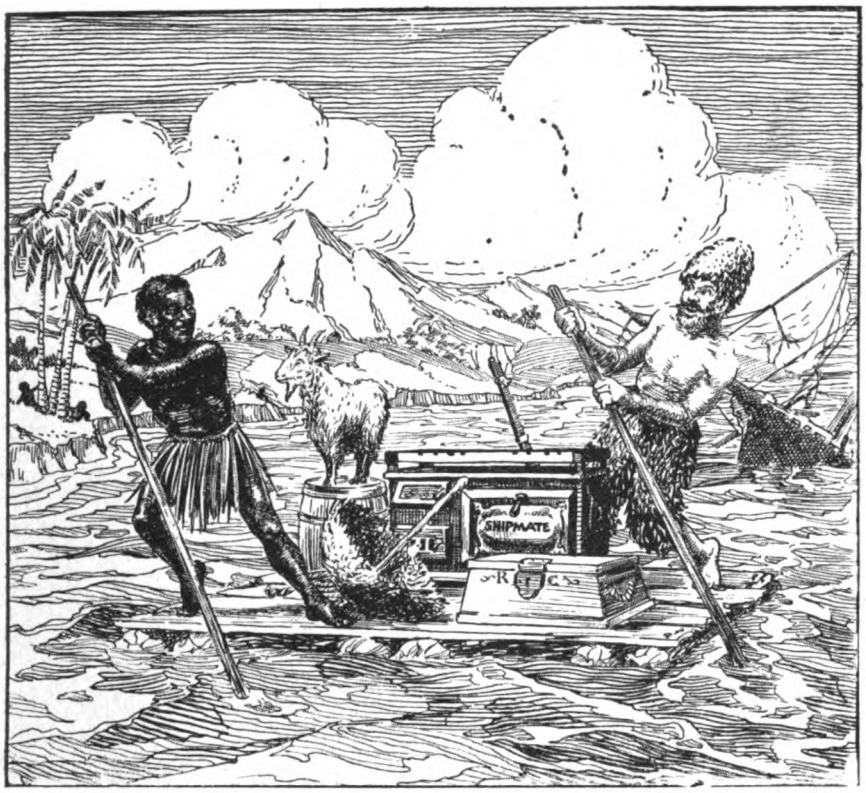


ROBINSON CRUSOE: "Now Friday when we get this SHIPMATE set up you'll see how real men live.

It was a Godsend that we were able to get it off the vessel."

SHIPMATES
are made only by

# THE STAMFORD FOUNDRY COMPANY

Established 1830 STAMFORD, CONN.

## Equipment for Marine Railways

Properly installed and adequate hauling facilities mean real profit to boat yards.

If you are planning for new railways, or need replacements for those you have, it will pay you to consult us.

We invite inquiries concerning the proper equipment to meet your needs.

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*Marine Hardware & Equipment*

**118 Chambers Street, New York City**

## The Strong, Quick Arm of a DAKE Steering Gear

on the tiller chain of your tug or steamer means greater efficiency, safety and economy.

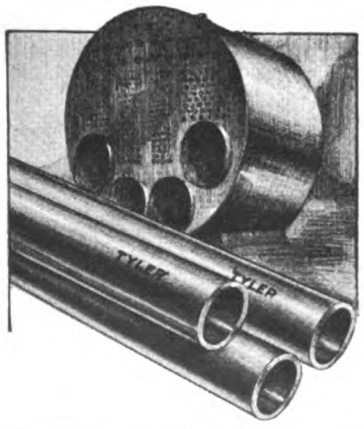
The Dake engine has no dead center; it is always alert, and starts instantly in either direction. This insures easier, quicker and better handling of your boat and saves time, coal and accidents.

The Dake fits into your pilot house and has a hand steering combination feature for emergency use.

Dependable gears at extremely moderate prices.

*Ask any skipper who is shipmates with one.*

**Dake Engine Co., Grand Haven, Mich.**

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For extreme service specify TYLER GENUINE CHARCOAL IRON—knobbled by hand in the old fashioned way—tested to 1000 lbs. hydrostatic pressure, and meeting all requirements of U. S. Steamboat Rules and Regulations, American Bureau of Shipping and A. S. M. E. Code Committee.

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Special Representatives: W. M. MacCleary-2 Rector St., New York City; W. H. S. Bateman and Co., Philadelphia, Pa.
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# GRAVING DOCKS in Repair and Reconditioning Work

*A series of talks, of which this is the third, on the importance of this type of drydock for survey, observation and repair activities.*

WHEN the freight steamer "Lord Dufferin" was rammed and sunk while at anchor and subsequently raised and placed in graving dock, a survey disclosed that about 64 feet of her entire stern was cut off.

Being unable to recover the damaged portion, it was found necesssary to rebuild her with entirely new material.

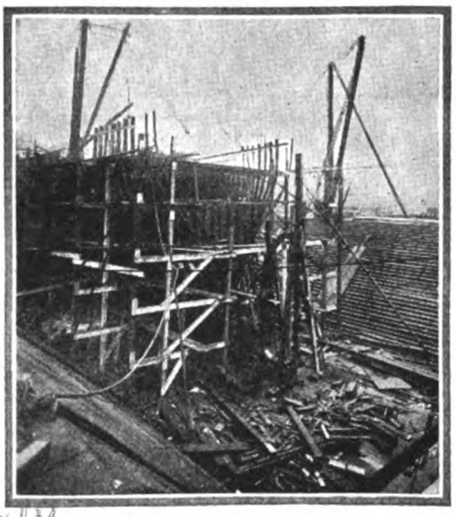
Placed on the substantial and perfectly aligned blocks of the graving dock, the damaged vessel was as comfortably settled as though on her original ways.

*Setting the new stern piece*

During the time required for preparing the hull work, our engineering force replaced the missing machinery.

At the completion of the work a second careful survey disclosed that every beam and frame had been perfectly aligned and took up its portion of the legitimate strain of the ship requiring practically no recalculation or readjustment.

The whole job of redesigning, furnishing and rebuilding was accomplished in eighteen and a half working days—an extraordinary tribute to the efficiency of a graving dock in repair and reconditioning work of this character.



*The only two privately owned graving docks in the Port of New York*

Todd craftsmanship and wide experience in building, repair and reconditioning work is as complete as its facilities and equipment for handling it, and in addition comprises the only two privately owned graving docks in the Port of New York.

## TODD SHIPYARDS CORPORATION

*Main Office: 25 Broadway, New York, N.Y., U.S.A.—Cable: Robin, New York. All codes*

**Twelve Shipways—Twenty-two Floating Docks—Two Graving Docks**

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TODD
NEW YORK, U.S.A.

Todd Dry Dock Engineering & Repair Corp.
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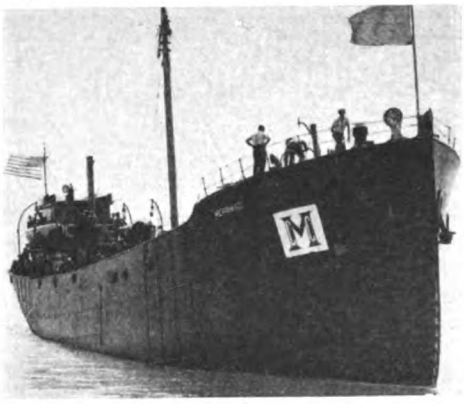
# Standard Diesel Oil Engine

Freighter MERRIMAC 144' long, 22'8" beam, 13'3" draft, owned by the Merrimac Chemical Company of Boston, Mass. Propelling engine is a Standard Full Diesel Direct Reversing Engine of 400 H. P.



WHY! — The Standard engine always gives unequalled economy, reliability of service and increases the earning capacity of a ship:—All this is available to you.

**Let our Engineers show you the opportunities with the**

## Standard Oil Engine

Write for a catalog

*Back of the Standard Gasoline & Oil Engines is the*

## Standard Motor Construction Company

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## Star Brass Mfg. Co.

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Accurate "Non-corrosive" Pressure and Recording Gages, Revolution Counters, Marine Clocks.

Dead Weight Gage Testers.

Marine Safety and Relief Valves for all pressures.

Marine Whistles and Sirens.

Extra Heavy Renewable Globe, Angle and Check Valves.

Star Outside Spring Steam Engine Indicators.

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SPECIFY AND ORDER THE BEST.

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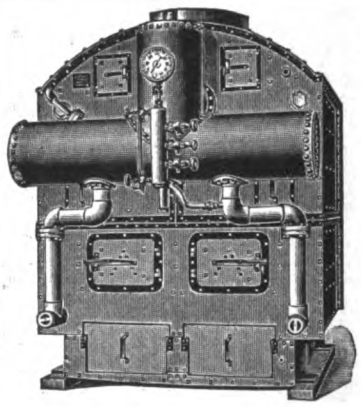

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## Almy Water Tube Boiler Co.

Builders of Sectional Water Tube Boilers for all types of vessels

**Providence, R.I. U. S. A.**

## Specify — Walker's "Trident" Electric Ship-log

Reading the Log in the Chart House.

This well made and dependable instrument electrically transmits your 'distance run' to the Chart House, or to any other position of the ship desired, thus obviating the delay and inconvenience caused by having to send a seaman aft to read the Log.

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Walker's 'Trident' Electric Ship Log — The Chart House Receiver.




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CARROLL D. WINSLOW
PRESIDENT

ELECTRIC FERRIES, INC.
GRAYBAR BUILDING
43RD STREET AND LEXINGTON AVE.
NEW YORK

November 1, 1927

The New London Ship & Engine Co.,
247 Park Ave.,
New York, N. Y.

Att: Mr. P. L. Sutphen

Dear Sirs:-

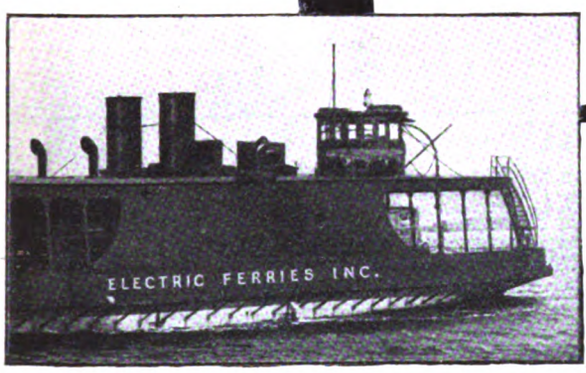
Knowing that you will be interested in the recent survey which we carried out in our six Diesel Electric Ferry Boats, we take pleasure in advising you of the general results obtained.

Our Naval Architect, Mr. Eads Johnson, undertook this investigation and, after a thorough examination of all working parts, found the Nelseco engines to be in excellent condition. We are also pleased to say that since the inauguration in November, 1926, of our ferry service between West 23rd Street, New York City and Weehawken, New Jersey, our boats have at no time been delayed due to engine troubles, and that our maintenance charges have been unusually low.

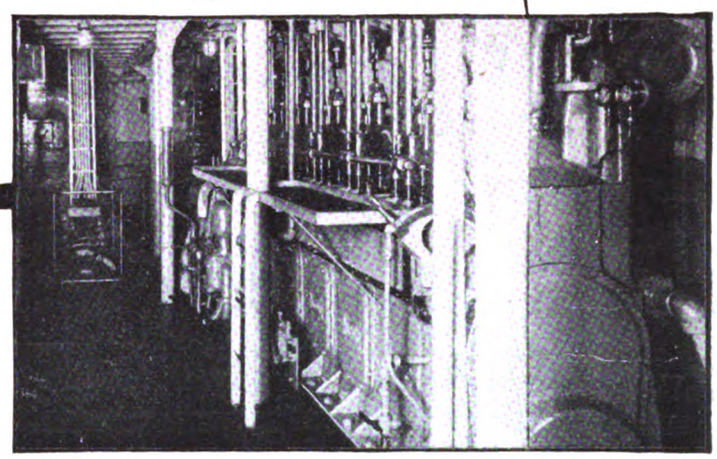
The operating economies which have resulted by the use of Diesel-Electric drive, have more than convinced ourselves of the many desirable features of this type of propulsion for our service.

Yours very truly,
ELECTRIC FERRIES, Inc.
Carroll D. Winslow
President.

*The "Charles W. Culkin," a Nelseco-powered unit of the Electric Ferries, Inc., fleet running between W. 23d St., New York City and Weehawken, New Jersey.*




*Engine room of the "Governor Moore," another of the Electric Ferries, Inc., boats. The "Governor Moore" (length Over All, 155 ft.; Beam, 48 ft.; Draft, 8 1-2 ft.) is powered with 2 350 B.H.P. at 280 R.P.M. type 6 MI-18 Nelseco Diesel engines. Speed 12.8 miles per hour.*



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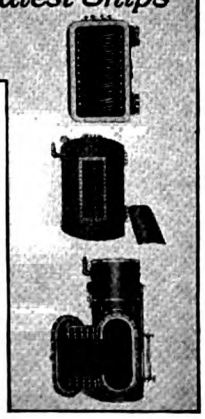

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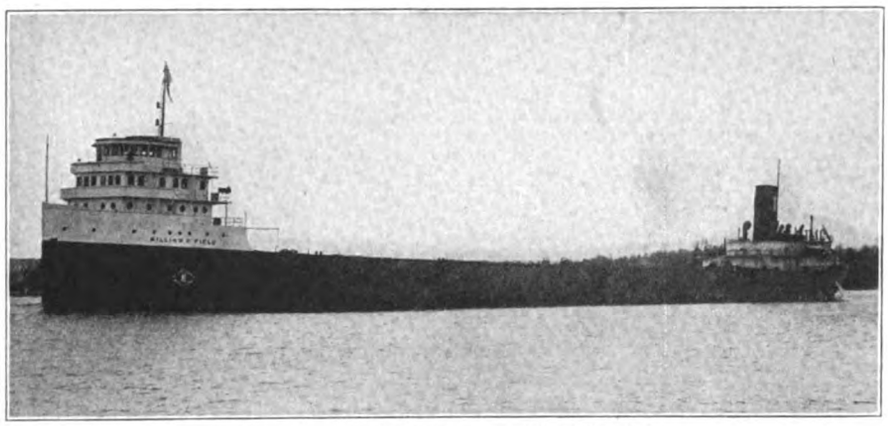

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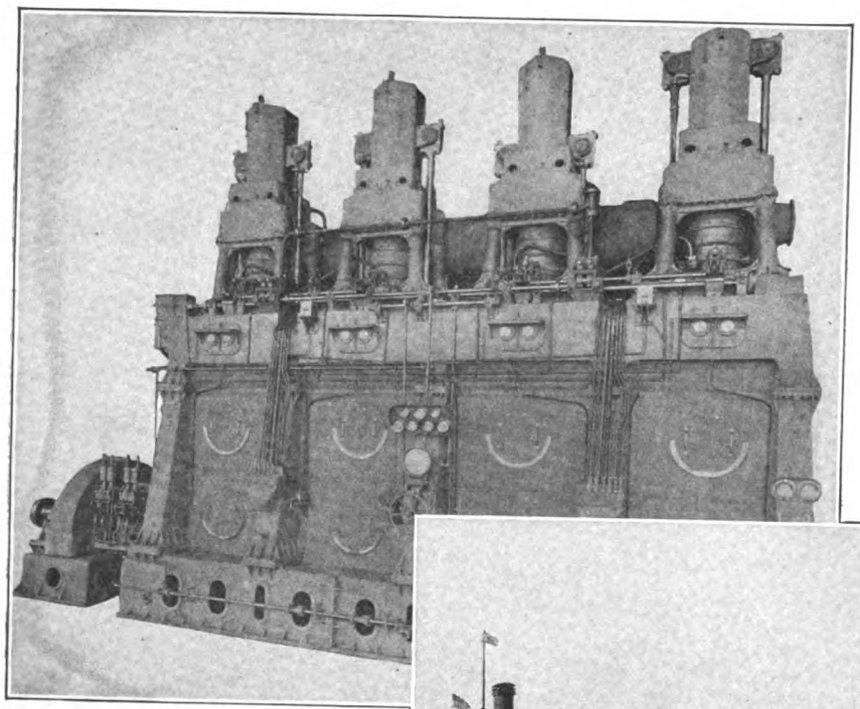
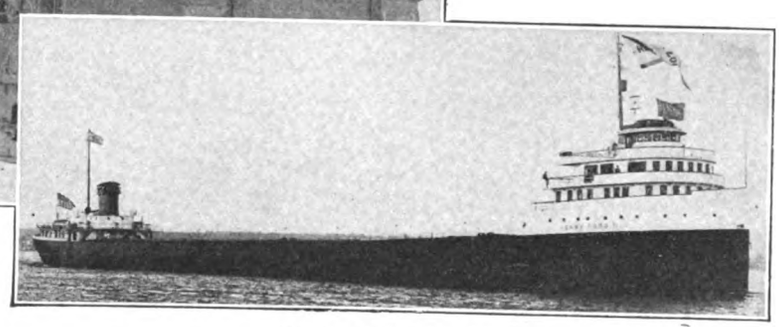
## SUN-DOXFORD DIESEL ENGINES

*The Engines that Power*

## "HENRY FORD II" *and* "BENSON FORD"



3000 S. H. P. Sun-Doxford Diesel Engines power the two motorships, "Henry Ford II" and "Benson Ford".



*M. S. "Henry Ford II"*

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# Washington-Estep Diesel Power For New U.S. Fish Patrol Boats

Two new boats of the U. S. Fish Patrol Service will cruise Pacific waters under the power of Washington-Estep Diesel Engines. The "Teal" and "Crane", sturdy voyagers that their names suggest, have secured further dependability by installing Washington-Estep Diesel Engines. There are no ifs and ands about the service these engines will deliver—reliable, economical and accessible Diesels under all conditions.

The "Teal" is 78' long x 18' x 6'6" draft using a 6 cylinder b.h.p. Direct Reversing Washington-Estep. The "Crane" is 90' long x 20' x 9'6" draft and will be powered with a 6 cyl. 200 b.h.p. Direct Reversing.

**WASHINGTON IRON WORKS**
**Seattle, U. S. A.**

826 Northwestern Bank Building, Portland, Oregon. W. H. Worden Co., San Francisco, Los Angeles. Sexton Motor Co., 149 Washington St., New York. Eclipse Engineering Co., 321 Chartres St., New York. British Columbia Representatives: Vancouver Machinery Depot, Ltd., Vancouver, B. C.

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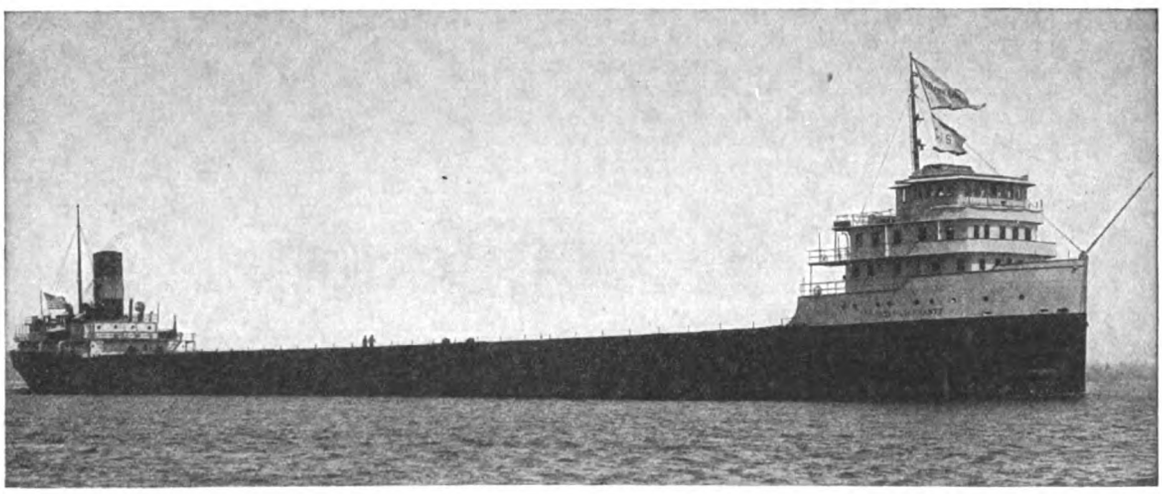
- Pistons Removable from Bottom of Cylinders
- Extra Large Caged Valves

**"WASHINGTON-ESTEP" DIESEL ENGINES**

# THE BABCOCK & WILCOX CO.

***Manufacturers of Marine Water Tube Boilers Since 1895***



**Steamer "JOSEPH H. FRANTZ", The Columbia Steamship Company**

**Equipped with**
**Babcock & Wilcox Water Tube Boilers and Superheaters**

**THE BABCOCK & WILCOX CO.**
**Marine Department**
**85 LIBERTY STREET, NEW YORK**



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# WHERE TO BUY

**HULLS (Steel)**
Ellis Channel System of Steel Hull Construction, 30 Church St., New York City.

**ICE MACHINES — See REFRIGERATING MACHINERY**

**INDICATORS (Direction and Revolution)**
Sperry Gyroscope Co.,
Sperry Bldg., Brooklyn, N. Y.

**INDICATORS (Helm Angle)**
Sperry Gyroscope Co.,
Sperry Bldg., Brooklyn, N. Y.

**INDICATORS (Speed)**
Cory, Chas., & Son, Inc.,
183 Varick St., New York City.
Sperry Gyroscope Co.,
Sperry Bldg., Brooklyn, N. Y.

**INSURANCE (Marine)**
Boland & Cornelius,
Marine Trust Bldg., Buffalo, N. Y.
Osborn & Lange, Inc.,
Insurance Exchange, 175 W. Jackson Blvd., Chicago, Ill.
Prindiville, John, & Sons,
208 S. La Salle St., Chicago, Ill.

**LAMPS (Mazda and Arc)**
General Electric Co., Schenectady, N. Y.

**LIFE BOATS, RAFTS, SUITS, PRESERVERS AND LIFE SAVING EQUIPMENT**
Welin Davit & Boat Corp.,
305 Vernon Ave., Long Island City, N. Y.

**LIGHTING EQUIPMENT**
Cory, Chas., & Son, Inc.,
183 Varick St., New York City.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**LOGS (Patent)**
Walker, Thomas, & Son, Ltd.,
58 Oxford St., Birmingham, England.

**LUBRICATING OIL**
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

**MACHINERY (Marine)**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bessemer Gas Engine Co., Grove City, Pa.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Shipbuilding Co., So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Hooven, Owens, Rentschler Co., Hamilton, O.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Toledo Ship Building Co., Toledo, O.
Washington Iron Works,
6th Ave. & Atlantic St., Seattle, Wash.

**MACHINISTS**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Milwaukee Dry Dock Co., Milwaukee, Wis.
New London Ship & Engine Co.,
11 Pine St., New York City.
Washington Iron Works,
6th Ave. & Atlantic St., Seattle, Wash.

**MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)**

**MARINE DECKING—See DECKING**

**MARINE GLUE**
Carpenter, Geo. B.; & Co.,
436 N. Wells St., Chicago, Ill.
Ferdinand, L. W., & Co.,
152 Kneeland St., Boston, Mass.

**MARINE GLUE (Liquid)**
Ferdinand, L. W., & Co.,
152 Kneeland St., Boston, Mass.

**MARINE HARDWARE**
Tiebout, W. & J.,
118 Chambers St., New York City.

**MARINE RAILWAY BUILDERS**
Crandall Engineering Co.,
102 Border St., Boston, Mass.

**MARINE SIGNALS**
American Strombos Co., Inc.,
5 South 18th St., Philadelphia, Pa.

**MARINE SUPPLIES**
Carpenter, Geo. B., & Co.,
436 N. Wells St., Chicago, Ill.
Tiebout, W. & J.,
118 Chambers St., New York City.

**MOTOR GENERATOR SETS**
Diehl Manufacturing Co., Elizabeth, N. J.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**MOTORS (Electric)**
Diehl Manufacturing Co., Elizabeth, N. J.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**MOTORS (Winch)**
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**NAUTICAL INSTRUMENTS**
Carpenter, George B., & Co.,
436 N. Wells St., Chicago, Ill.
Ritchie, E. S., & Sons, Brookline, Mass.
Sperry Gyroscope Co.,
Sperry Bldg., Brooklyn, N. Y.

**NAVIGATION INSTRUMENTS**
White, Kelvin & Wilfried O., Co.,
112 State St., Boston, Mass.

**NITROGEN (Gas)**
Linde Air Products Co.,
30 E. 42nd St., New York City.

**NUTS—See BOLTS AND NUTS**

**OAKUM (Marine, Rope, Packings, Plumbers)**
Stratford, George, Oakum Co.,
165 Cornelison Ave., Jersey City, N. J.

**OIL BURNERS**
Peabody Engineering Corp.,
110 E. 42nd St., New York City.

**OIL BURNING EQUIPMENT**
Babcock & Wilcox Co.,
85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Coen Company, Inc.,
50 Church St., New York City.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

**OIL CLARIFIERS**
De Laval Separator Co.,
165 Broadway, New York City.

**OIL FOR ALL PURPOSES (Marine)**
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

**OIL HEATER**
Coen Company, Inc.,
50 Church St., New York City.

**OIL PURIFIERS**
De Laval Separator Co.,
165 Broadway, New York City.
Sharples Specialty Co.,
23rd & Westmoreland Sts., Philadelphia, Pa.

**OIL SEPARATION**
Sharples Specialty Co.,
23rd & Westmoreland Sts., Philadelphia, Pa.

**OIL STRAINERS**
Coen Company, Inc.,
50 Church St., New York City.

**OXYGEN (Gas)**
Linde Air Products Co.,
30 E. 42nd St., New York City.

**PACKING (Tarred and Untarred Jute)**
Stratford, George, Oakum Co.,
Jersey City, N. J.

**PASSENGER SERVICE**
United American Lines, Inc.,
39 Broadway, New York City.

**PIPE (Welded)**
American Welding Co.,
30 Church St., New York City.

**PIPING (Cold Storage)**
Frick Company, Waynesboro, Pa.

**PLASTER FIBRE**
Stratford, George, Oakum Co.,
Jersey City, N. J.

**PLATES (Floor)**
American Pressed Steel Co.,
Commercial Trust Bldg., Philadelphia, Pa.

**PLUMBERS' OAKUM**
Stratford, George, Oakum Co.,
Jersey City, N. J.

**POWDERED COAL BURNERS**
Peabody Engineering Corp.,
110 E. 42nd St., New York City.

**PROPELLER BLADES AND HUBS**
Columbian Bronze Corporation,
Freeport, Long Island, N. Y.
Sheriffs Mfg. Co., Milwaukee, Wis.

**PROPELLER WHEELS**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Detroit Ship Building Co., Detroit, Mich.
Great Lakes Engineering Works,
River Rouge, Mich.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Sheriffs Mfg. Co., Milwaukee, Wis.
Toledo Ship Building Co., Toledo, O.
Trout, H. G. Co.,
220 Ohio St., Buffalo, N. Y.

**PROPELLERS**
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Columbian Bronze Corp.,
Freeport, L. I., N. Y.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.

**PUMPS**
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Great Lakes Engineering Works,
River Rouge, Mich.
Ingersoll-Rand Co.,
11 Broadway, New York City.

**PUMPS (Ballast)**
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

**PUMPS (Bilge)**
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

**PUMPS (Boiler Feed)**
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

**PUMPS (Direct Acting)**
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

**PUMPS (Fuel Oil)**
Coen Company, Inc.,
50 Church St., New York City.

**PUMPS (Power)**
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

**PUMPS (Steam)**
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

**PUMPS (Vacuum)**
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

**PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS**

**PURIFIERS (Oil)**
De Laval Separator Co.,
165 Broadway, New York City.

**RADIO COMPASS AND DIRECTION FINDER**
Federal Telegraph Co.,
812 Hobart Bldg., San Francisco, Cal.
Independent Wireless Telegraph Co.,
2-3 South St., New York City.
Radio Corp. of America,
66 Broad St., New York City.

**RADIO EQUIPMENT**
Federal Telegraph Co.,
812 Hobart Bldg., San Francisco, Cal.
Independent Wireless Telegraph Co.,
2-3 South St., New York City.
Radio Corp. of America,
66 Broad St., New York City.

**RAILWAY DRY DOCKS**
Crandall Engineering Co.,
102 Border St., Boston, Mass.

**RANGES**
Stamford Foundry Co., Stamford, Conn.

**REFRIGERATING MACHINERY**
Frick Company, Waynesboro, Pa.

**RELEASING GEARS FOR LIFEBOATS**
Welin Davit & Boat Corp.,
305 Vernon Ave., Long Island City, N. Y.



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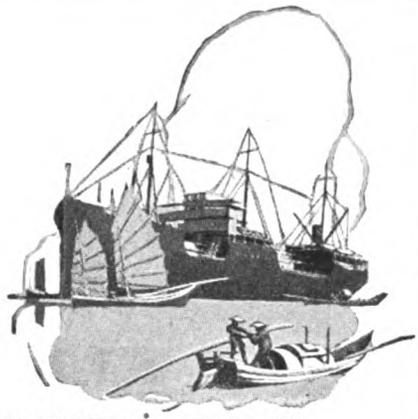


# "STANDARD"
## *Diesel Fuel Oil*

The vast organization and scope of the Standard Oil Company of New Jersey make it possible to offer shipping interests world wide facilities for bunkering with **"Standard" Diesel Fuel Oil.** Our Diesel Oil is a highly refined and clean product, suitable for use in all full Diesel engines. It is recommended by the leading Diesel motor manufacturers.

## "STANDARD" Diesel Fuel Oil

### *Distributing Stations*

**Atlantic Coast**
New York
Baltimore
Norfolk
Charleston

**Gulf Coast**
Baton Rouge
New Orleans
Baytown

**Pacific Coast**
San Francisco
Richmond
San Pedro
San Diego
Astoria
Portland
Point Wells
Seattle
Ketchikan
Juneau
Tacoma
Willbridge

**Hawaiian Islands**
Honolulu

**Canada**
Halifax
Vancouver
Prince Rupert
Montreal

**Panama Canal**
Balboa

**West Indies**
St. Thomas

**South America**
Campana
Buenos Aires
Talara

**Azores**
Ponta Delgada

**United Kingdom**
Purfleet
Southampton
Liverpool
Brixham
Hull
Newcastle
South Shields
London
Thames Haven
Avonmouth
Glasgow
Belfast

**Norway**
Bergen
Oslo (Steilene)

**Denmark**
Copenhagen
Nyborg
Aarhus
Aalborg

**Sweden**
Stockholm
Gothenberg
Helsingborg
Malmo

**Germany**
Hamburg
Nordenham

**Holland**
Amsterdam
Rotterdam

**Belgium**
Antwerp

**Italy**
Genoa

**Africa**
Bizerta
Algiers

**Turkey**
Constantinople

**Suez Canal**
Port Said

**Straits Settlement**
Singapore

**Greece**
Piraeus

**Roumania**
Constanza

**China**
Hong Kong
Shanghai

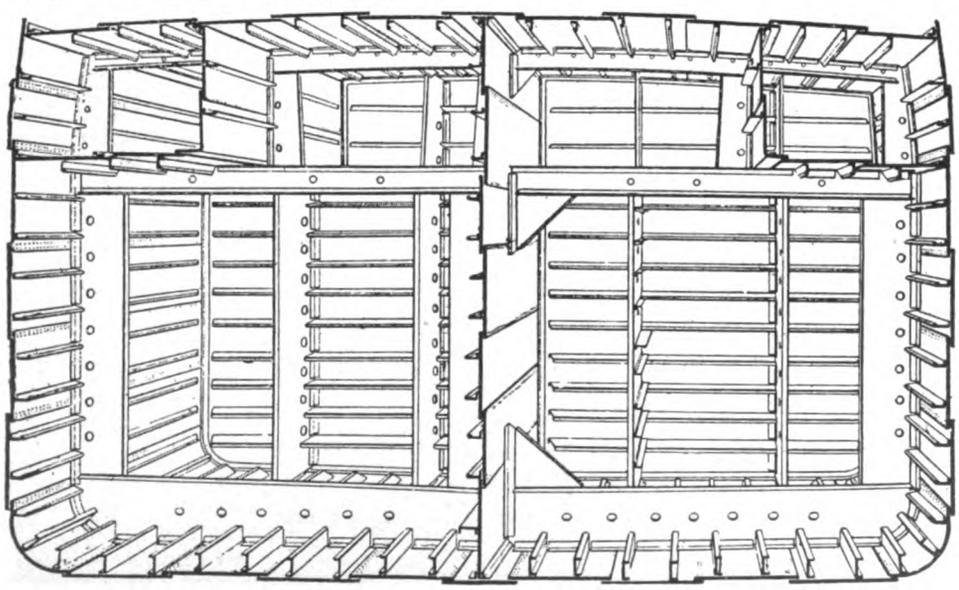
**STANDARD OIL COMPANY OF NEW JERSEY 26 BROADWAY NEW YORK**

# *Progress in Oil-Tank Ship Construction*

## THE "BRACKETLESS—SYSTEM"

**(PATENTED)**

**Eliminates Bulkhead Brackets. Eliminates Bulkhead Leakage. Greatly simplifies construction. Greatly reduces cost of upkeep and cost of damage repairs. Greatly reduces cost of cleaning tanks. Substantially increases the longitudinal strength beyond the well-tried "Isherwood System."**



***For Particulars Apply***

## Sir Joseph W. Isherwood, Bt.

**17 Battery Place, New York and 4, Lloyd's Avenue, London, E.C. 3**



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# WHERE TO BUY

**REPAIRS (Electric)**
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**REPAIRS (Marine)**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Shipbuilding Co., So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
Toledo Ship Building Co., Toledo, O.

**REPAIRS (Marine Engines)**
New London Ship & Engine Co.,
11 Pine St., New York City.

**REPAIRS (Turbine)**
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**REVOLUTION COUNTERS**
Sperry Gyroscope Co.,
Manhattan Bridge Plaza, Brooklyn, N. Y.

**RIVETS**
Oliver Iron & Steel Corp.,
10th and Muriel Sts., Pittsburgh, Pa.

**RIVETS (Boiler) — See BOILER RIVETS**

**ROPE (Manila)**
Columbian Rope Co., Auburn N. Y.

**ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)**
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co.,
46 South St., New York City.

**ROPE (Transmission)**
Columbian Rope Co., Auburn, N. Y.

**ROPE (Wire)—See WIRE ROPE**

**ROPE OAKUM**
Stratford, George, Oakum Co.,
Jersey City, N. J.

**RUST PREVENTATIVE (Oil)**
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

**SAFETY VALVES (Marine)**
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

**SCHOONERS (Auxiliary)**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Chicago Shipbuilding Co., So. Chicago, Ill.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Toledo Ship Building Co., Toledo, O.

**SEARCHLIGHTS (High Intensity)**
Sperry Gyroscope Co.,
Sperry Bldg., Brooklyn, N. Y.

**SEARCHLIGHTS (Incandescent and Arc)**
General Electric Co., Schenectady, N. Y.
Sperry Gyroscope Co.,
Sperry Bldg., Brooklyn, N. Y.

**SEPARATORS (Oil)**
Babcock & Wilcox Co.,
85 Liberty St., New York City.
De Laval Separator Co.,
165 Broadway, New York City.

**SHIPBUILDERS**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
Toledo Ship Building Co., Toledo, O.

**SHIPBUILDING SYSTEMS**
Isherwood, J. W.,
17 Battery Place, New York City.

**SHIP CONSTRUCTION (Channel System)**
Ellis Channel System of Steel Hull Construction, 30 Church St., New York City.

**SHIP LOGS**
Walker, Thomas, & Son, Ltd.
58 Oxford St., Birmingham, England.

**SHIP REPAIRS**
Morse Dry Dock & Repair Co.,
Foot of 56th St., Brooklyn, N. Y.

**SHIP STABILIZERS**
Sperry Gyroscope Co.,
Sperry Bldg., Brooklyn, N. Y.

**SIGNALS**
American Strombos Co., Inc.,
5 South 18th St., Philadelphia, Pa.

**SPUN OAKUM**
Stratford, George, Oakum Co.,
Jersey City, N. J.

**STEAMSHIP LINES (Passenger and Freight)**
United American Lines, Inc.,
39 Broadway, New York City.

**STEAM DRUMS**
American Welding Co.,
30 Church St., New York City.

**STEAM GAGES**
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

**STEAM HEADERS**
American Welding Co.,
30 Church St., New York City.

**STEAM TRAPS**
Davis Engineering Co.,
90 West St., New York City.

**STEEL BARGES—See BARGES (Steel)**

**STEERING ENGINES**
Hyde Windlass Co., Bath, Me.

**STEERING GEARS**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.

**STORAGE BATTERIES**
Electric Storage Battery Co.,
Philadelphia, Pa.

**STOVES**
Stamford Foundry Co., Stamford, Conn.

**STRAINERS (Oil)**
Coen Company, Inc.,
50 Church St., New York City.

**SUPERHEATERS (Marine)**
Foster Wheeler Corp.,
165 Broadway, New York City.

**SWITCHBOARDS**
Cory, Chas., & Son, Inc.,
183 Varick St., New York City.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**TANK CLEANING**
Salvage Process Corporation,
30 Broad Street, New York City.

**TANKS (Ammonia and Carbon Dioxide Storage)**
American Welding Co.,
30 Church St., New York City.

**TELEGRAPH (Electrical, Mechanical)**
Cory, Chas., & Son, Inc.,
183 Varick St., New York City.

**TELEPHONE SYSTEMS**
Cory, Chas., & Son, Inc.,
183 Varick St., New York City.

**TORSION METERS**
Cummings Machine Works,
255 Atlantic Ave., Boston, Mass.

**TOWING**
Moran Towing & Transportation Co.,
17 Battery Place, New York City.

**TOWING LINES**
Whitlock Cordage Co.,
46 South St., New York City.

**TRANSMISSION (Rope)—See ROPE (Transmission)**

**TUBES (Boiler, Stay, Yarrow)**
Keating, E. F., Co.,
446 Water St., New York City.
Tyler Tube & Pipe Co., Washington, Pa.

**TURBINES (Electric)**
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**TURBINES (Marine)**
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**TURBINES (Steam)**
De Laval Steam Turbine Co., Trenton, N. J.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**TWINE AND ROPE**
Columbian Rope Co., Auburn, N. Y.

**VALVES AND FITTINGS**
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.

**VENTILATING EQUIPMENT**
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

**WATER GAGES AND ALARMS**
Jerguson Gage & Valve Co.,
Winter Hill, Somerville, Mass.

**WATER PURIFICATION SYSTEMS**
Griscom-Russell Co.,
285 Madison Ave., New York City.

**WELDERS (Electric Arc)**
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**WELDING (Thermit)**
Metal & Thermit Corporation,
120 Broadway, New York City

**WELDING AND CUTTING GAS**
Metal & Thermit Corporation,
120 Broadway, New York City.
Prest-O-Lite Co., Inc.,
30 E. 42nd St., New York City.

**WHISTLES**
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

**WINCHES**
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.
Welin Davit & Boat Corp.,
305 Vernon Ave., Long Island City, N. Y.

**WINDLASSES**
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Carpenter, George B., & Co.,
436 N. Wells St., Chicago, Ill.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

**WINDOWS (Balanced Frameless)**
Kearfott Engineering Co., Inc.,
Roebling Bldg., 117 Liberty St.,
New York City.

**WIRE AND WIRING DEVICES**
Cory, Chas., & Son, Inc.,
183 Varick St., New York City.

**WIRE ROPE**
Durable Wire Rope Co.,
93 Pearl St., Boston, Mass.

**WIRELESS MESSAGE SERVICE**
Federal Telegraph Co.,
812 Hobart Bldg., San Francisco, Cal.
Independent Wireless Telegraph Co.,
2-3 South St., New York City.
Radio Corp. of America,
66 Broad St., New York City

**WIRELESS SETS AND APPARATUS**
Federal Telegraph Co.,
812 Hobart Bldg., San Francisco, Cal
Independent Wireless Telegraph Co.,
2-3 South St., New York City.
Radio Corp. of America,
66 Broad St., New York City.

**ZINC (Coiled Rolled Strips)**
Hazel-Atlas Glass Co.,
16th and Market St., Wheeling, W. Va.



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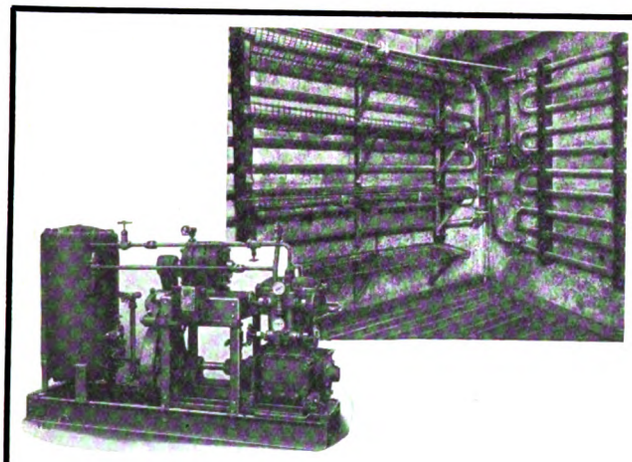
# THE CRANDALL ENGINEERING CO.

## ENGINEERS

BOSTON MASS.

Designers of
RAILWAY DRY DOCKS
FLOATING DRY DOCKS
BASIN DRY DOCKS

8000 TON FLOATING DOCK
CHARLESTON DRY DOCK & MACHINE CO.
CHARLESTON, S. C.



FRICK

## Refrigerating Machines

Have a good service record at sea. Ask any engineer who has used a Frick. Illustrated bulletins will tell you why they are superior. Write

Frick Company

*And so the hours kept tolling*
*And through the ocean rolling*
*Went the brave ship "Iberis" bowling*
*Before the break of day.*

WHEN her gear creaks and her timbers strain she needs to be "tight". Real sailormen, those who love their ships, know that the only oakum to use to keep seams tight is the best. That's why most of them insist on

## STRATFORD OAKUM

For nearly a century the seams of vessels staunch and true have been caulked with Stratford Oakum. Heavy weather then means little more than rolling and pitching, for Stratford Oakum keeps the seams tight.

Caulk right and she'll stay tight—that's the story when you use Stratford Oakum. Don't accept a substitute; there is none "just as good".

## GEORGE STRATFORD OAKUM COMPANY

Jersey City, New Jersey

*Also manufacturers of Cotton Wiping Waste.* *4

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## HAMBURG-AMERICAN LINE

*Passenger Services*

New York to Cherbourg, Southampton and Hamburg.
New York and Boston to Cobh (Queenstown) and Hamburg.

*Freight Services*

New York to Hamburg direct.
Philadelphia, Baltimore and Norfolk to Bremen and Hamburg.
U. S. Pacific Coast Ports to Northern Europe.

United American Lines, Inc.
*General Agents*
26 Broadway New York

## ANDREW J. MORSE & SON, Inc.

221 High Street BOSTON, MASS.
*Established 1837*

Diving Apparatus and Submarine Armor
Fire Department Supplies
The Morse Monitor Nozzle
Callahan Shut-Off Nozzle

## BOILER TUBES

Seamless Steel—Charcoal Iron—Lapwelded Steel
Marine and Stay Tubes with Marine Certificates
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446-454 Water St., New York, N. Y.
Immediate Shipment from New York Stock
Telephone Orchard 9700

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*Contracts a Specialty*

New Branch now open
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Propeller Wheels, Marine Engines, Brass and Iron Castings. Large variety of Grate Bars in stock.

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## Edward P. Farley & Co.

Incorporated

Steamship Owners, Agents and Brokers

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| | | | | | |
|---|---|---|---|---|---|
| Marine Engineers Guide—Audel | $3.00 | (15s.) | Practical Shipbuilding, 2 volumes—Holms | $22.50 | (£4. 12s. 4d.) |
| Marine Engineers Handbook—Sterling | $7.00 | (35s.) | Navigation—Hosmer | $2.50 | (12s. 6d.) |
| Marine Steam Turbines—Bauer | $4.00 | (20s.) | Navigation and Nautical Astronomy—Coffin-Collins | $3.00 | (15s.) |
| Marine Cold Storage Heating and Ventilation on Shipboard—Walker | $2.50 | (12s. 6d.) | Wrinkles in Practical Navigation, pocket edition—Lecky | $5.00 | (25s.) |
| Care and Operation of Naval Machinery—Dinger | $3.00 | (15s.) | Modern Seamanship, pocket edition Knight | $3.00 | (15s.) |
| Steam Boilers—Peabody | $4.00 | (20s.) | Practical Seamanship for Use in the Merchant Service—Todd and Whall | $9.00 | (45s.) |
| Practical Shipbuilding—McBride | $3.00 | (15s.) | Notes on the Practical Duties of Shipmasters—Wilkes | $2.00 | (10s.) |
| Building the Emergency Fleet—Mattox | $5.00 | (25s.) | | | |
| How Wooden Ships are Built—Estep | $3.00 | (15s.) | | | |
| Steel Ships, Construction and Maintenance—Walton | $14.00 | (£3. 0s. 0d.) | | | |

**THE PENTON PUBLISHING COMPANY**

Penton Bldg., Lakeside Ave. and West 3rd St. Book Department Cleveland, O. 323 IM




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# Classified Advertisements

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Please have remittance accompany order.

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**WANTED FIRST CLASS SHIP DRAFTSMAN** for hull, machinery and electrical work. Also experienced estimator. APPLY: The Charles Ward Engineering Works, Charleston, West Virginia.

## For Rent

**OIL ENGINE MANUFACTURER HAVING** a large sales and exhibition room down town, New York, will sublet part of office exhibition space particularly suitable for exhibition of marine equipment or boat display. Address Box 389, MARINE REVIEW, Cleveland.

**I HAVE A NICELY FURNISHED ROOM,** heated day and night, with bath. Will give home cooked meals and room including washing and mending for $10 per week. Mrs. S. C. Wiggans, 1789 West 54th St., Cleveland, Ohio.

## For Sale

**FOR SALE: MARINE ENGINES AND** boilers of all sizes, light draft wooden and steel tug boats for sale or charter, derrick boats, deck scows and lighters for sale or charter. Cowles' Towing Co., Ohio St., Buffalo, N. Y.

**STEAM TUG "ERNA". LENGTH 55',** beam 13' depth 5'. Engine 12½ x 14. Boiler allowed 150 lbs. steam. All in first class condition. Write or wire Newago Tug Line, Inc. Ashland, Wis.

## Position Wanted

**Salesman-Representative**
Acquainted maritime interests around New York would represent a concern having a product or service salable to vessel owners. R. C. Kip, Room 401, 136 Liberty St., New York City.

## For Sale

**FOR SALE ONE SCOTCH BOILER 13½** ft. dia. 140 pounds working pressure. U. S. inspection. One pair Twin Scotch boilers 7 ft. dia., 180 lbs., Canadian inspection. Also triple expansion engine used with same. One steam windlass with 1⅝" chain and another for ¾" chain, together with anchors and chains. Full stock of secondhand marine machinery on hand. Quebec Machinery & Supply Co. Ltd., 19 Canoterie Hill, Quebec, P. Q., Canada.

## Wanted

**TWO FIREBOX MARINE BOILERS ABOUT** 8' wide x 14' long containing about 104 tubes 3½" allowed 100 to 125 pounds pressure. Doty Engineering Company, Toronto, Canada.

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# Index to Advertisements


A

Almy Water Tube Boiler Co..... 74
American Bridge Co..... 68
American Pressed Steel Co..... 58
American Ship Building Co.....6, 7
American Strombos Co., Inc..... 70
American Welding Co..... 66

B

Babcock & Wilcox Co..... 81
Bethlehem Steel Co..... 71
Boland & Cornelius..... 86

C

Carpenter, Geo. B., & Co..... 60
Coen Company, Inc..... 76
Columbian Bronze Corp..... 76
Columbian Rope Co..... 55
Cory, Chas., & Son, Inc..... 65
Crandall Engineering Co..... 85
Cummings Machine Works..... 58

D

Dake Engine Co..... 72
Davis Engineering Corporation.... 76
De Laval Separator Co..... 63
De Laval Steam Turbine Co..... 61
Dean Brothers Co..... 64
Detroit Ship Building Co.....6, 7
Durable Wire Rope Co..... 68

E

Electric Storage Battery Co..... 53
Ellis Channel System of Steel Hull Construction ..... 68

F

Falk Corporation, The....Front Cover
Farley, Edward P., & Co., Inc..... 86
Ferdinand, L. W., & Co.,..... 58
Frick Company..... 85

G

General Electric Co.....8, 9
Goldschmidt, Th., Corporation.... 69
Great Lakes Engineering Works 10
Griscom-Russell Co., The..... 62

H

Hazel-Atlas Glass Co..... 68
Hyde Windlass Co.....Back Cover

I

Independent Wireless Telegraph Co. ..... 64
Ingersoll-Rand Co..... 59
Isherwood, Joseph W..... 83

J

Jerguson Gage & Valve Co..... 60

K

Keating, E. F., Co..... 86
Kelvin & Wilfrid O. White Co..... 86

L

Linde Air Products Co., The.....
.....Inside Front Cover

M

Manitowoc Shipbuilding Corp..... 66
Metal & Thermit Corporation..... 62
Moran Towing & Transportation Co., Inc..... 47
Morse, Andrew J., & Son, Inc..... 86
Morse Dry Dock & Repair Co..... 70
Mulholland Hatch-Fastener Co..... 76

N

National Forge & Ordnance Co..... 64
New London Ship & Engine Co..... 75
Newport News Shipbuilding & Dry Dock Co..... 51

O

Oldman-Magee Boiler Works, Inc. 76
Oliver Iron & Steel Corporation.... 66
Osborn & Lange, Inc..... 86

P

Peabody Engineering Corp..... 67
Port Huron Coal & Dock Co.....
.....Inside Back Cover
Prindiville, John, & Sons..... 86

R

Radio Corporation of America..... 60
Ritchie, E. S., & Sons..... 70

S

Sheriffs Manufacturing Co..... 70
Sperry Gyroscope Co..... 3
Stamford Foundry Co..... 72
Standard Motor Construction Co. 74
Standard Oil Co. of New Jersey.... 83
Star Brass Mfg. Co..... 74
Stratford, George, Oakum Co..... 85
Sturtevant, B. F., Co.....Back Cover
Sun Shipbuilding & Dry Dock Co. 79

T

Texas Co., The..... 49
Tiebout, W. & J..... 72
Todd Shipyards Corporation..... 73
Toledo Shipbuilding Co., Inc..... 77
Trout, H. G., Co..... 86
Tyler Tube & Pipe Co..... 72

U

United American Lines, Inc..... 86
United States Shipping Board Merchant Fleet Corporation..... 57

V

Vacuum Oil Co..... 4

W

Walker, Thos., & Son. Ltd..... 74
Washington Iron Works..... 81
Westinghouse Electric & Mfg. Co. 90
White, Kelvin & Wilfrid O., Co..... 86
Whitlock Cordage Co..... 62
Winton Engine Co..... 89




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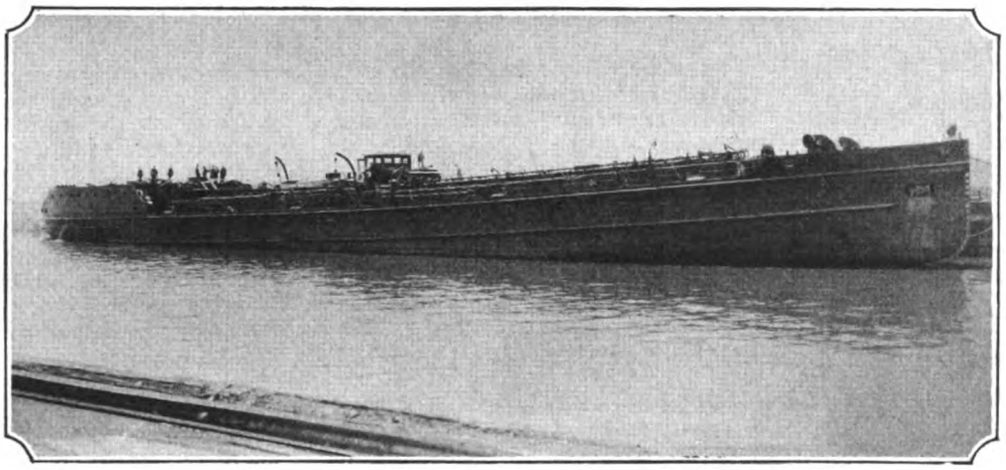
# WINTON

## Diesel-Engines



*OIL Tanker Tydol. Length overall 258′ 8″. Beam 40′ 0″. Draft, 12′ 0″. Built by Sun Shipbuilding and Dry Dock Company. Designed and owned by Tidewater Oil Company, New York City. Main power plant, two Model 121, six-cylinder, Winton-Diesel Engines, each developing 350 H. P. at 225 R.P.M. Auxiliary power plant, two Model 116-4, four-cylinder, Winton-Diesel Engines, each direct connected to a 75 K.W., 230 volt, generator.*

THE WINTON ENGINE COMPANY
CLEVELAND, OHIO, U. S. A.

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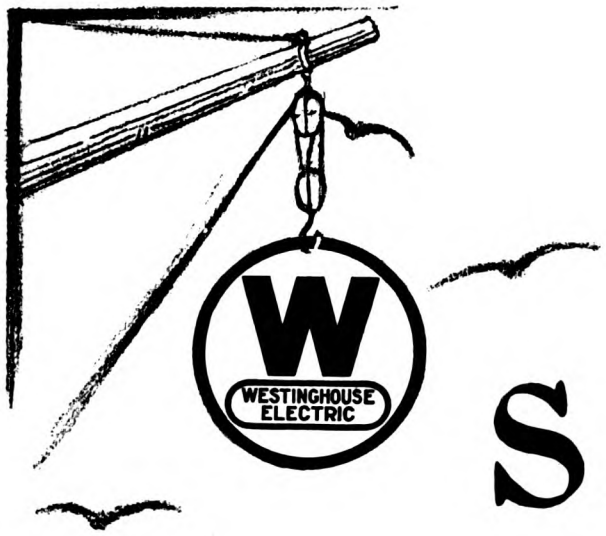



# Service

IN perhaps no other branch of industry does service assume such importance as in the marine field. Ships must maintain schedules or heavy losses ensue, and at the same time the service must be absolutely dependable for the protection of life and property at sea.

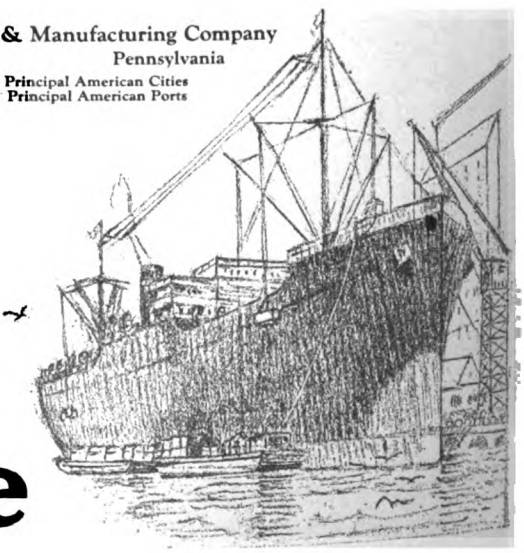
Westinghouse, by virtue of its enormous resources, is particularly fitted to render quick and dependable maintenance and repair service. In the principal ports of the country Westinghouse has excellently equipped and stocked marine service shops, manned by efficient engineers and mechanics, specially trained in marine work.

In addition to this highly specialized marine service department, there is the general Westinghouse Service organization with representatives in all important cities, capable of handling the majority of marine service calls.

Besides casualty service, Westinghouse also provides specialists to superintend installations and instruct engineers in operation and ordinary maintenance.

Inspections of Westinghouse apparatus by these specialists upon arrival of vessels in port is another branch of this extensive service. The importance of this feature lies in the discovery of the necessity for minor adjustments or repairs which obviates serious casualties with their attendant expense and inconvenience.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal American Cities
Service Stations in Principal American Ports



**Westinghouse**

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# BUNKER COAL

*—Day & Night Watches—*

## FAST FUELING

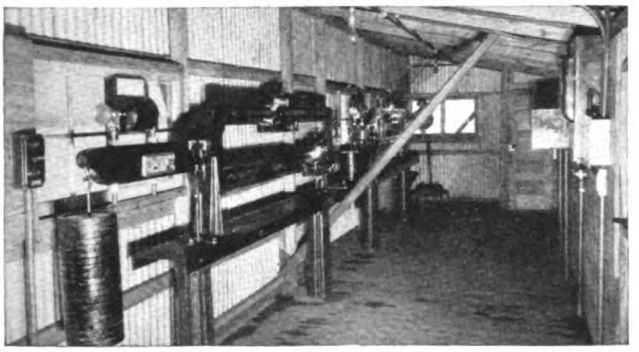
***Twenty-four hour service***
***The fastest and most up-to-date***

### FUEL DOCK
### on the Great Lakes

Storage capacity in elevated bins 700 tons. Specially designed Fairbanks Scales accurately weigh every *pound* of coal that passes into your bunker.

**—at Port Huron on St. Clair River beside International Tunnel**

Best West Virginia Coal.
Breakage Reduced to minimum.



*This is interior of scale house showing separate scales for each bin.*
*Punched weight ticket shows actual tonnage loaded into your bunker.*

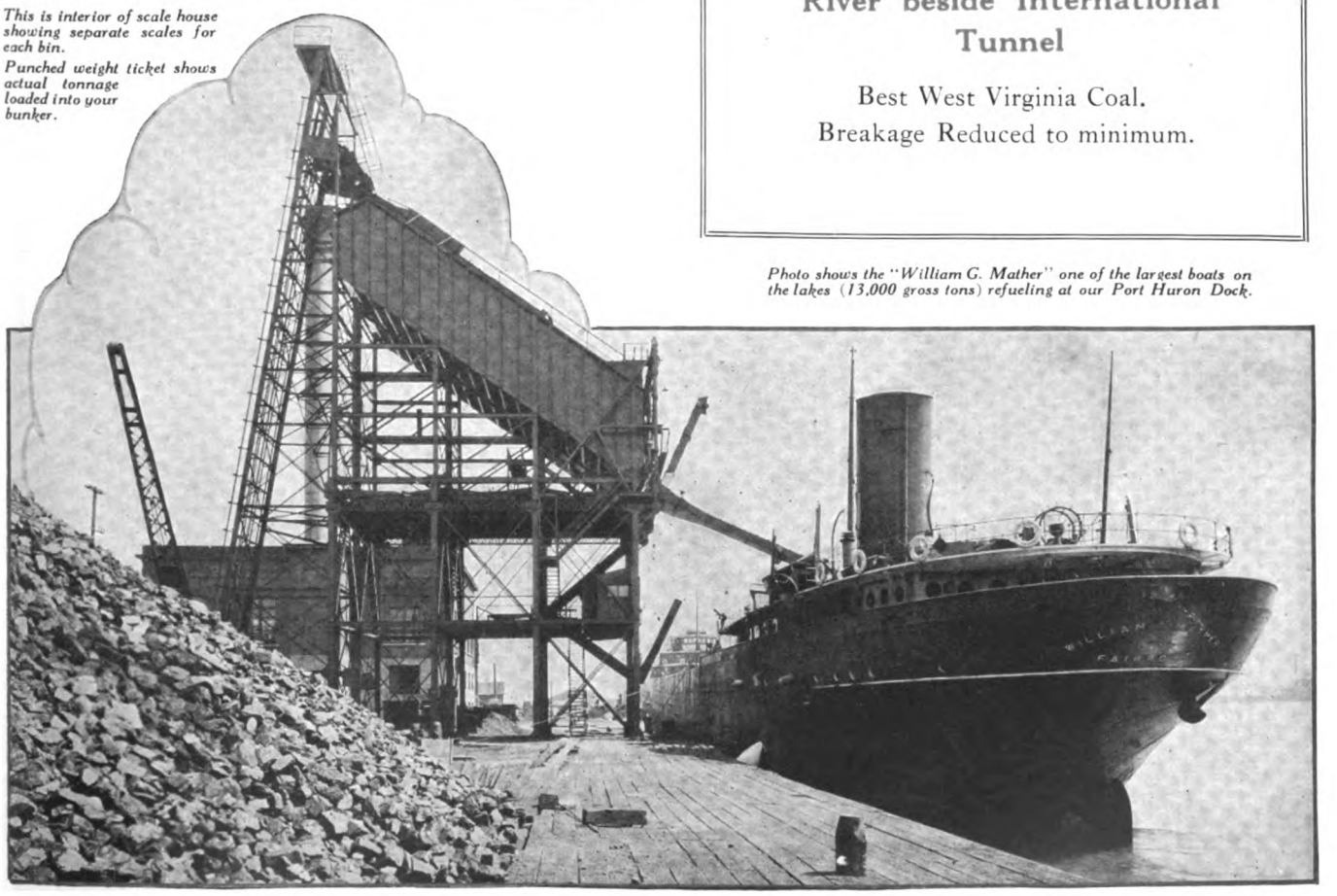


*Photo shows the "William G. Mather" one of the largest boats on the lakes (13,000 gross tons) refueling at our Port Huron Dock.*

# PORT HURON COAL & DOCK COMPANY

**PORT HURON, MICHIGAN**
**EXECUTIVE OFFICES—1460 UNION TRUST BLDG., CLEVELAND, OHIO**



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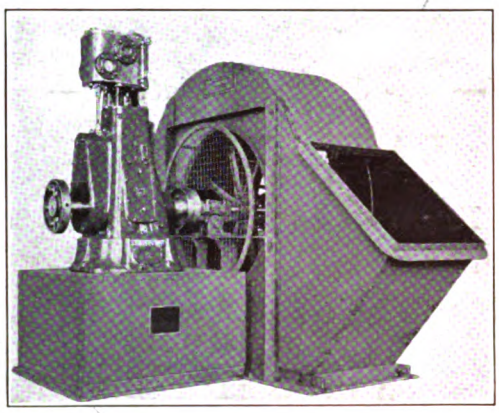
# Sturtevant Steel Plate Fans



## Ideal for Marine Forced Draft

THE ideal performance of Sturtevant Steel Plate Forced Draft Fans is the outcome of sound engineering principles of design and finest manufacturing methods of construction.

They are designed for slow speeds and therefore have comparatively large diameter wheels making it possible to obtain the necessary tip speed to develop the desired pressure without excessive rotative speeds. Because of the fan wheel construction, air velocities through the fan are low and uniform. Low rotative speed and low air velocity combined results in practically noiseless and vibrationless operation under normal conditions.

The particular type of Sturtevant Steel Plate Forced Draft Fan shown at the left is built especially for Marine duty and may be either engine or turbine driven. Let us send you further data on this fan.

Sturtevant PUTS AIR TO WORK

*Sturtevant Marine Products*

Heating and Ventilating Equipment—Mechanical Draft Equipment—Turbines—Motors—Blowers—Ventilating Sets — Heaters — Generating Sets — Exhausters — Gasoline and Steam Engines.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

*Sales Engineering Offices in all principal cities*

*Plants located in* Hyde Park, Mass.; Framingham, Mass.; Sturtevant, Wis.; Camden, N. J.; Berkeley, Cal.; Galt, Ontario

1760

If You Want the Best Specify

# Hyde

S. S. "H. F. HARVEY" owned by Pittsburgh Steamship Co. and built by Great Lakes Engineering Works.

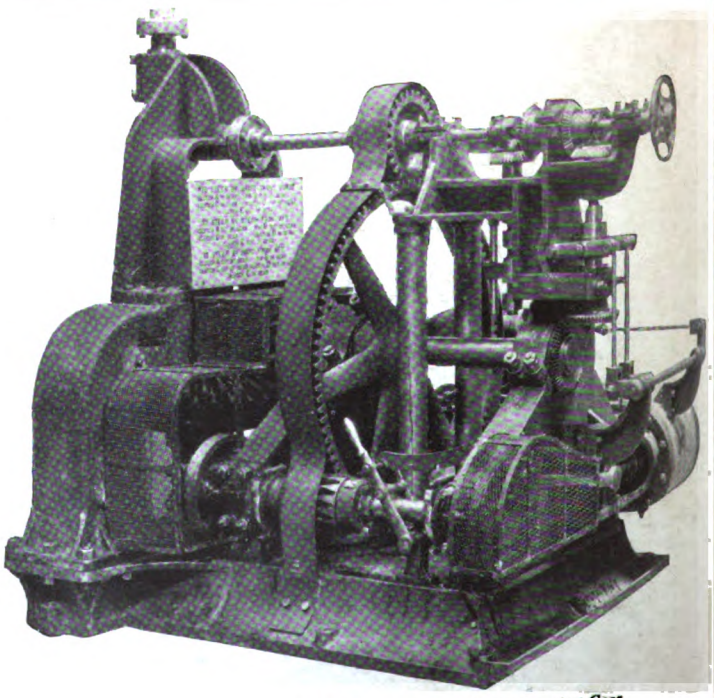
S. S. "B. F. AFFLECK" owned by Pittsburgh Steamship Co. and built by Toledo Shipbuilding Co.

S. S. "S. T. Crapo" owned by Huron Transportation Co. and built by Great Lakes Engineering Works.

These three fine new boats are all equipped with

**Hyde**

Quadrant Type Steering Gear
Spur Gear Windlass
Mooring Winches
Hatch Winches



*HYDE Quadrant Type Steering Gear*

# Hyde Windlass Company

**Bath, Maine**

New York Office, 172 Chambers St.

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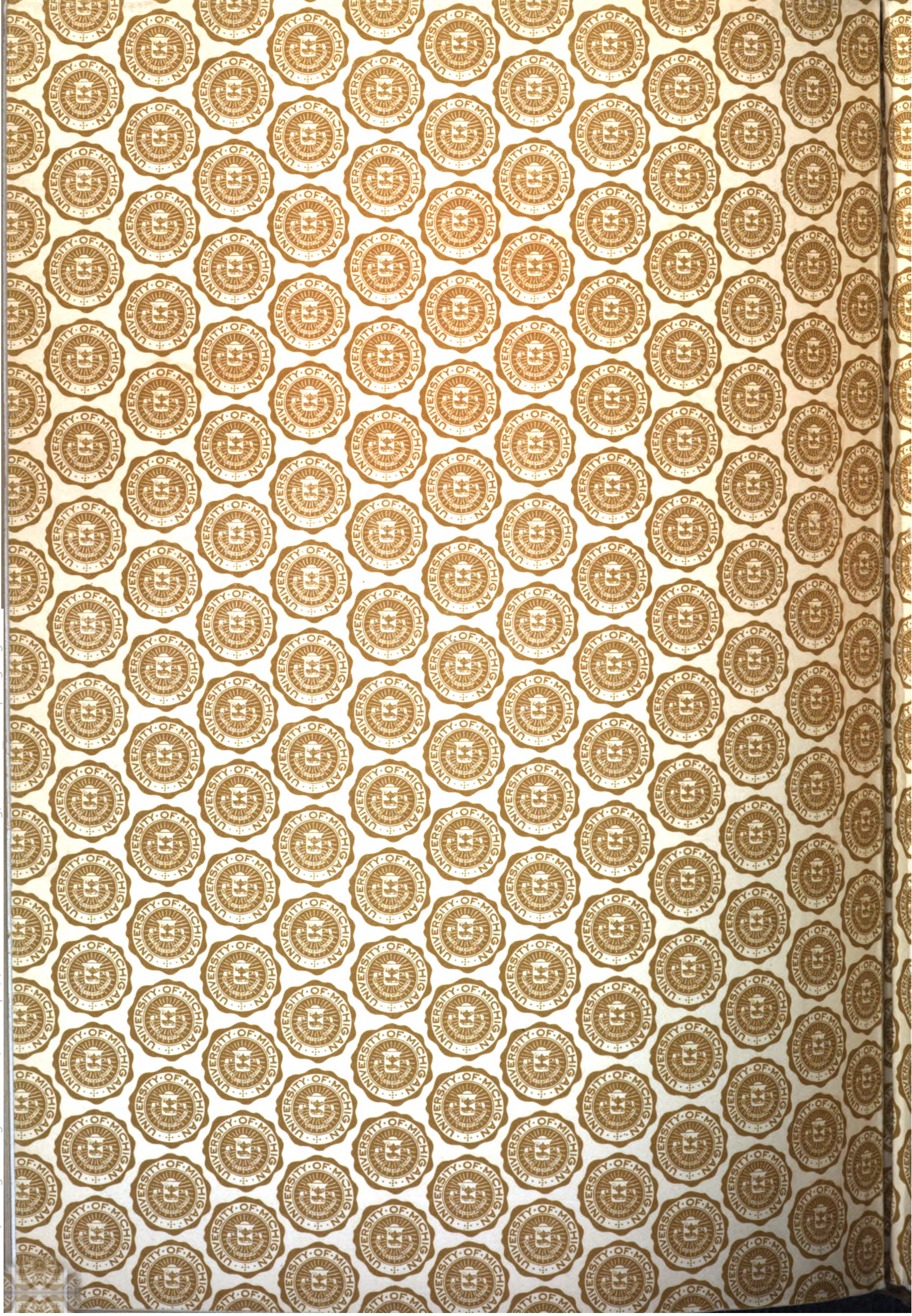

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